MAY, 1945

Railway Engineering and Maintenance

Miracles Performed

A Tribute to American Enterprise

1944 was the biggest year in the history of American Railroading, 737 billion ton-miles of freight were carried. This is almost double the load carried in the last war, with only two-thirds of the locomotives and with only three-quarters of the freight cars they had in 1918.

HY-PRESSURE HY-CROME SPRING WASHER

There's more here than meets the eye!

● It looks like a SPRING WASHER . . . it feels like a SPRING WASHER . . . but can you rely on it to perform efficiently and economically as a SPRING WASHER? CERTAINLY!

● RELIANCE HY-PRESSURE HY-CROME SPRING WASHERS have been developed only after laboratory research and exhaustive field tests wtih the helpful cooperation of many railroad users.

● Today RELIANCE HY-PRESSURE HY-CROME SPRING WASHERS exceed A.R.E.A. requirements for reactive pressure, reactive range and non-fatiguing service and possess inherent qualities not evident to the naked eye.

● If you are not acquainted with the HY-CROME SPRING WASHER FAMILY take advantage of this opportunity to write for descriptive folders or have a service engineer call at your convenience. HY-CROME SPRING WASHERS equal to meeting the requirements of every specific track application are available. In every one there's more quality than meets the eye.

EATON

EATON MANUFACTURING COMPANY

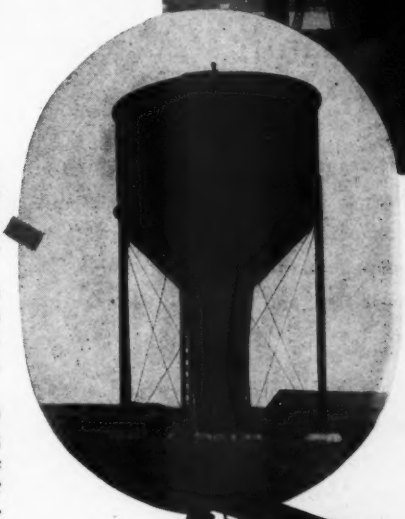
MASSILLON, OHIO *Reliance Division*

Sales Offices: **New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal**

1 RAIL JOINTS
NO-OX-ID serves a dual purpose in protection of rail joints. It provides required lubrication and prevents corrosion of metal.

2 BRIDGES
NO-OX-ID stops corrosion on bridge structures. It can be applied directly over adhering rust and paint without costly, time-consuming precleaning.

3 WATER TANKS
NO-OX-ID gives protection to inside and outside areas of tanks. Stops pitting in tank interiors without contaminating water.



3 MAJOR MAINTENANCE JOBS DONE WELL AT LOW COST!

It is mighty important when maintenance crews are operating short-handed, to conserve labor. NO-OX-ID, the *original* rust preventive, saves those valuable man-hours as well as saving the metal structures to which it is applied.

With NO-OX-ID, expensive cleaning before application is unnecessary. NO-OX-ID coatings may be applied directly over rusted surfaces. Maintenance costs are thus greatly reduced... as much as 50%.

When applied to *clean* metal, NO-OX-ID forms a protective film that lasts indefinitely; applied to *rusted* surfaces, it penetrates to the parent metal and immediately stops further corrosion. In localized areas on the metal surface where rust scale is particularly heavy, NO-OX-ID stops corrosion and loosens scale. A final touching up of scattered bare spots prevents further metal loss.

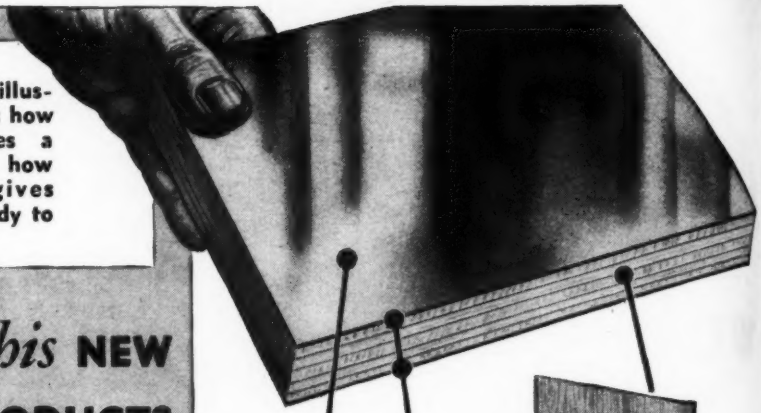
Write for details about NO-OX-ID protection for *your* property. It assures lasting protection at low cost.

The ORIGINAL RUST PREVENTIVE

Dearborn Chemical Company • Dept. U, 310 S. Michigan Ave., Chicago 4, Ill.
New York • Los Angeles • Toronto

Published monthly by Simmons Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

The sample of INDERON illustrated at the right, shows how the plastic facing gives a smooth, hard surface — how the plywood core gives "depth", strength and body to the plastic laminate.



Just what is this NEW STRUCTURAL PRODUCT?

INDERON

It is *plastic-faced plywood.* The hard, smooth, grainless plastic is *permanently fused* to a laminated resin-bonded plywood core.

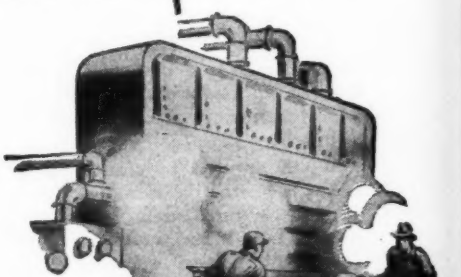
NOW plastic and plywood have been combined —"alloyed" — to produce a structural product which offers the smooth, hard, permanently finished qualities of plastic plus the strength, durability and rigidity of exterior type plywood.

INDERON is waterproof — resistant to moisture and vapor — resistant to chemicals, decay, fungi and temperature changes. It is stable — strong, durable. It needs no surface protection — no additional decorative treatment.

In your postwar planning, consider the advantages of this smooth, hard-surfaced plastic-plywood laminate for freight car roofs and linings, for exterior siding, for station fixtures, for signs and markers, for refrigerator cars, for bulk-loading cars—for any structural use where low cost, workability, smoothness and strength are desirable. Three grades will be available—Standard, Decorative and Industrial. Write for complete data—today.

INDERON panels are permanently faced with three or more layers of a resin-impregnated plastic. This gives INDERON its hard, smooth, durable surface.

The core of each INDERON panel is resin-bonded exterior type fir plywood. This gives rigidity, strength and "balance"—makes possible a LOW COST plastic laminate with depth and body.



The plastic facing is permanently fused to the plywood core by heat and pressure. It can't come loose! Plastic and plywood become, in effect, a single heat-bonded unit. Panels, available in standard 4 x 8 foot sizes, are smooth, hard, strong, durable, yet easy to work, form and fasten.

Manufacturers

Buffelen Lumber & Mfg. Co.
Tacoma 2, Wash.

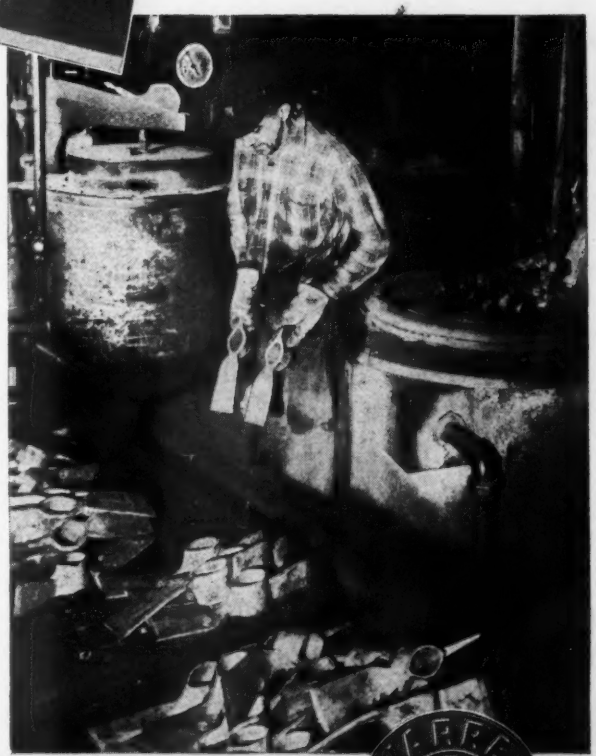
Washington Veneer Co.
Olympia, Wash.

For Information Write

CHICAGO SALES OFFICE
9 South Clinton St., Chicago 8, Illinois

HERE'S WHY CUTTING EDGES ON WARREN-TEED MATTOCKS

Keep Cutting



Here's the answer to long-lasting cutting edges — proper hardening and tempering . . . an operation which requires up-to-date equipment and experience.

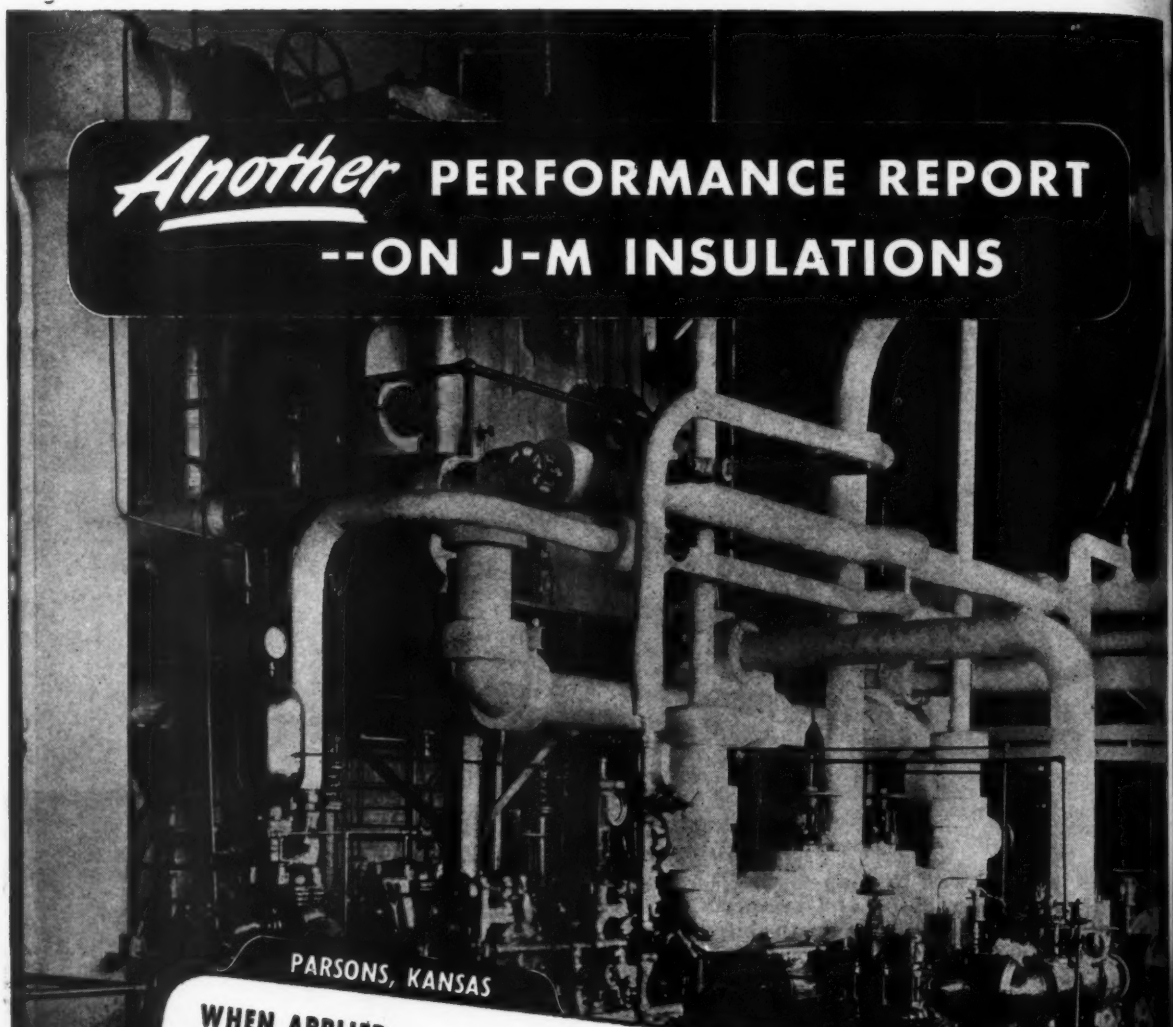
Lead pots, to the right, heat the **WARREN-TEED** mattocks to the correct temperature so as to develop a fine grain. Tempering furnaces in the background of the picture have automatic time and temperature controls and this guarantees a hard, tough structure. And in the foreground — you see experience as exemplified by this man who has been quenching **WARREN-TEED** mattocks for many years. He knows just how the blades should be "worked" into the bath to impart a uniform hardness.

Such exercised care in every manufacturing step explains why **WARREN-TEED** and Devil mattocks, sledges, mauls, picks, adzes, and track chisels have sharp cutting edges and uniform bevels, true striking faces, and excellent balance.

Warren Tool manufactures heavy hand tools, including **WARREN-TEED** and the famous Devil Line, *exclusively* for the railroad and hardware trade.

WARREN TOOL CORP. • WARREN, OHIO

Another PERFORMANCE REPORT --ON J-M INSULATIONS



PARSONS, KANSAS

WHEN APPLIED: 1923

MAINTENANCE: Less than $10 average yearly

PRESENT CONDITION: Excellent -- no loss in thermal efficiency

REMARKS: In the power plant of the M. K. & T. R.R. at Parsons, Kansas, there are five Sterling 518 h.p. boilers, turning out approximately 30,600,000 lbs. of steam per month. The installation in 1923 included: 1780 lineal feet of J-M Asbesto-Sponge Felted in various thicknesses and diameters; 300 sq. ft. of J-M 85% Magnesia for covering feedwater heaters; and 3400 lbs. of J-M Asbestos Plastic Cement for pipe fittings and boilers. Considering the size of the installation, maintenance has been negligible -- approximately $200 in 21 years, or less than $10 average per year.

JM PRODUCTS

Johns-Manville

87 YEARS OF SERVICE TO TRANSPORTATION

Insulations • Packings • Friction Materials Refractory Cements • Building Materials

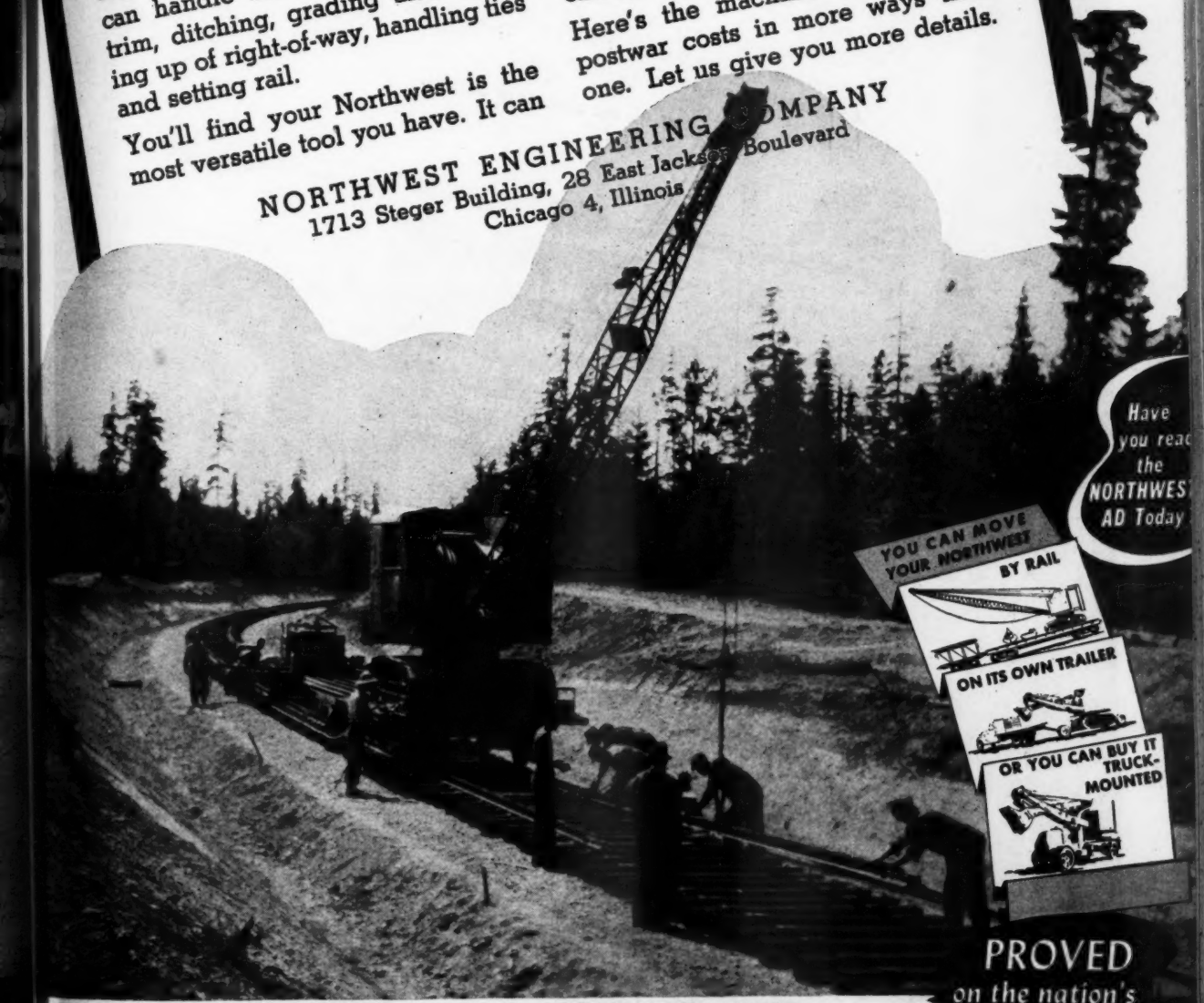
Cut the Cost of SIDING AND SHORT-LINE WORK!

Look at this job! Look at the number of men! Tractor motive power! One flat! Crawler crane working from the flat! On a job like this a Northwest of only ½ yd. capacity can handle the cut and fill, bank trim, ditching, grading and building up of right-of-way, handling ties and setting rail.

You'll find your Northwest is the most versatile tool you have. It can be crawler, or truck mounted. It will handle rail tongs, tie grapple, pile driver leads, dragline bucket, clamshell or orange peel bucket, pipe sling, magnet or backfiller and it can be converted from a crane to a shovel or pullshovel by simply changing booms.

Here's the machine that will cut postwar costs in more ways than one. Let us give you more details.

NORTHWEST ENGINEERING COMPANY
1713 Steger Building, 28 East Jackson Boulevard
Chicago 4, Illinois



PROVED on the nation's LEADING RAILROADS

NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

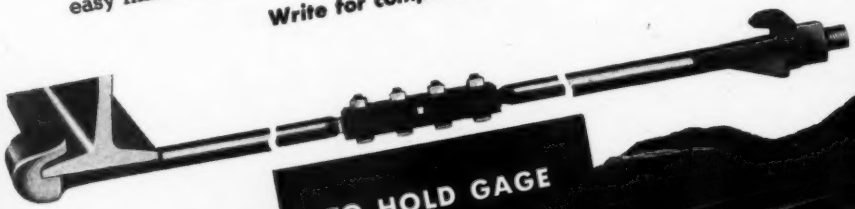
A dependable source of Track Economies . . .

OLIVER GAGE RODS

By firmly tying both rails together as a single unit, Oliver Gage Rods provide a worthwhile source of track economies. They prevent rail movement, reduce regaging and extend the life of ties.

Oliver Gage Rods are manufactured in styles to suit various requirements and conditions. They are designed and made for easy installation and long life.

Write for complete details.



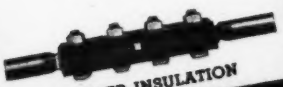
TO HOLD GAGE

—on stiff curves
—at main switches
—near crossings
—wherever service is severe

FORGED RAIL HOOK

BENT RAIL HOOK

END RAIL JAW



CENTER INSULATION

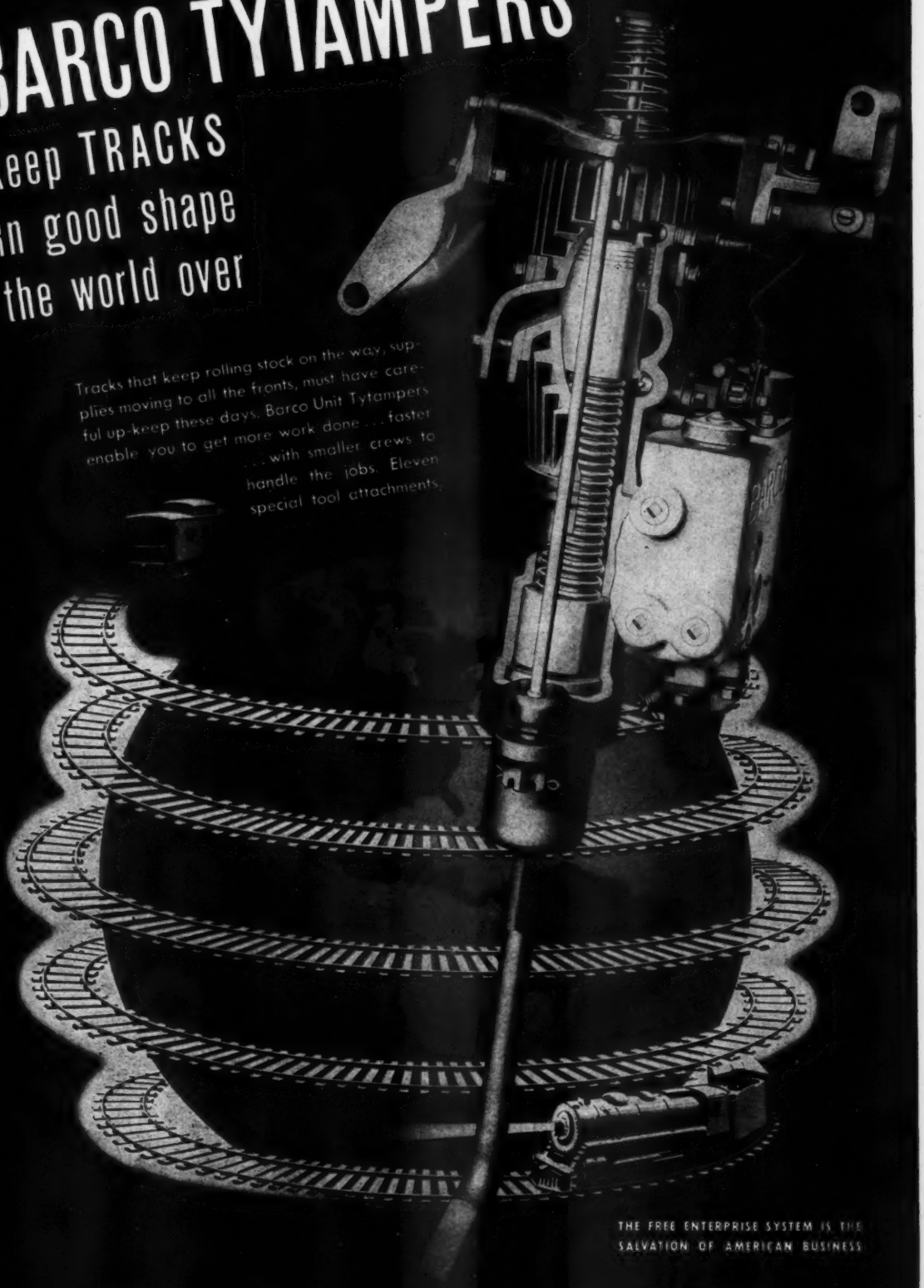
OLIVER
IRON AND STEEL
Corporation

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH 3, PENNSYLVANIA

BARCO TYTAMPERS

keep TRACKS in good shape the world over

Tracks that keep rolling stock on the way, supplies moving to all the fronts, must have careful up-keep these days. Barco Unit Tytampers enable you to get more work done . . . faster . . . with smaller crews to handle the jobs. Eleven special tool attachments.



THE FREE ENTERPRISE SYSTEM IS THE SALVATION OF AMERICAN BUSINESS

BARCO MANUFACTURING COMPANY, NOT INC., 1805 Winnemac Ave., Chicago 40, Ill. • In Canada: The Holden Co., Ltd., Montreal, Can.

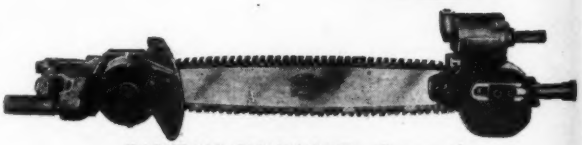
CUTS THROUGH TIMBERS AT A SPEED OF AN INCH A SECOND!

DISSTON CHAIN SAW with Mercury Gasoline Engine

Railroad construction and maintenance departments, in increasing numbers, are helping to overcome the handicap of manpower shortage through the use of this time-and-cost-cutting saw. On numerous operations it has been shown that a Disston Chain Saw enables one crew to equal the work of 20 men with crosscut saws.

Disston Chain Saws are used by the railroads for cutting stringers, bents, braces and piles in trestle work; trimming switch ties to size; cutting timbers for buildings and other construction work. Their uses are many.

Being made of the finest materials and with characteristic Disston thoroughness, the saws will stand up in service. They are light in weight, easy to handle, and require no previous experience. Supplied in two types: with Mercury Gasoline Engine, and with pneumatic drive. Either can be operated for horizontal or vertical cutting.



DISSTON CHAIN SAW—Pneumatic

Disston Chain Saws are *available now*. Write for full particulars.

HENRY DISSTON & SONS, INC., 541 Tacony, Philadelphia 35, Pa., U.S.A.

STOP RAIL CREEPAGE

Highest Reapplication Value
Millions in Service

WOODINGS
FORGE & TOOL CO.
Verona, Pa.

WOODINGS RAIL ANCHOR

To OFFSET an OFF-CENTER Load!

• To offset the effects of an off-center load . . . to keep the load pushing straight ahead, without whipping or jerking, Oliver "Cletrac" offers you *controlled differential steering.*

On an Oliver "Cletrac" tractor, the pull of one track is balanced against the pull of the other. The relative speeds of the tracks may be changed to offset the side pull of an off-center load. Power is never completely disconnected from either track at any time . . . *even on turns.*

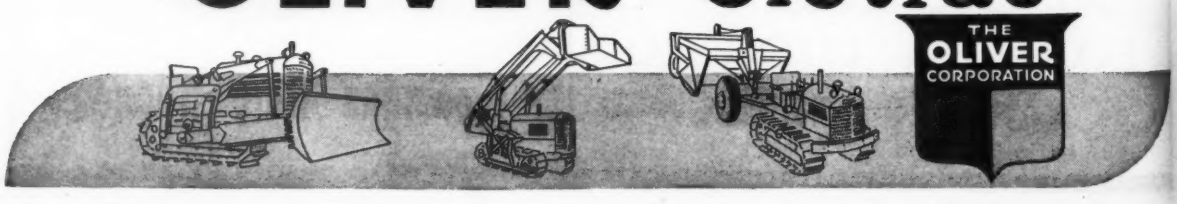
Bulldozing, trailbuilding or grading, the *controlled differential steering* of Oliver "Cletrac" tractors means added safety. They are always under perfect control . . . on hills or levels. And they steer the same going downhill or up! There's no need to "declutch" or "brake" when turning.

Ruggedly built for long, dependable service, Oliver "Cletrac" tractors are designed to withstand the shocks, strains and twists of construction service. Their unusual accessibility makes maintenance a simple task.

Substantial numbers of Oliver "Cletracs" are now being released for essential use. Your Oliver "Cletrac" dealer will gladly assist you in making application for a new tractor.

The OLIVER Corporation, Industrial Division: 19300 Euclid Avenue, Cleveland, Ohio.

OLIVER - Cletrac



CP Flanged Wheel Compressors
CP Tie Tampers

CP Self-Propelled, Two-Stage, Air-Cooled Compressors give from 15% to 35% more air per gallon of fuel, an economy possible through gradual speed regulator, varying speed gradually up and down exactly with air demand! Self-propelling drive is sturdy and reliable — there are no complicated gears or clutches. Unit consists of CP gasoline or Diesel-driven compressor, mounted on flanged wheel truck.

Self-propelled and non-self-propelled models of CP Compressors are available in sizes from 60 c.f.m. to 500 c.f.m. actual capacity.

To take full advantage of portable compressor capacities, use CP Tie Tampers — noted for their ease of handling as well as low air consumption. CP Tie Tampers are efficient in "nipping" and on small rises — also on jobs where the track is raised several inches.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

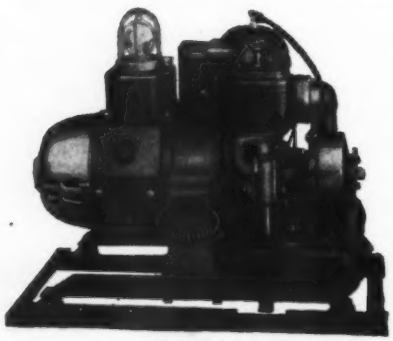
CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

LIGHT

BRIGHT
and
RIGHT

Only 100 pounds complete, a Homelite Gasoline-Engine-Driven Generator has the power to furnish plenty of electric power . . . 2000 watts . . . enough to operate the brilliant floodlighting you need for emergency night repairs. *



A Homelite Portable Generator is *right* from the standpoint of design and construction. Light, compact, rugged, easy to start, easy to operate, easy to keep in top condition, and extremely dependable at all times.

* Just one of many uses for a Homelite. Send for our new booklet showing all the time-saving uses of Homelite Portable Generators, Pumps, and Blowers.

HOMELITE CORPORATION
Portable PUMPS • GENERATORS • BLOWERS
PORT CHESTER, NEW YORK

Tough Grinding Jobs

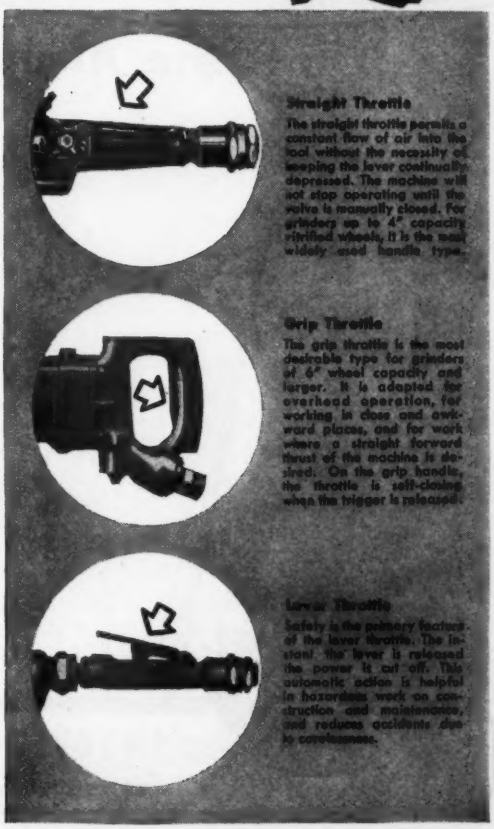
MADE EASY with

Thor PORTABLE AIR GRINDERS

On the heaviest, toughest type of grinding jobs Thor rotary air grinders are unsurpassed for turning out a large amount of work each day. Extremely well balanced and ruggedly built, Thor portable grinders are leading the field for dependable, continuous service at a minimum maintenance cost. These efficient grinders have an abundance of mighty power and yet are exceptionally thrifty on the air they require to operate.

WIDE RANGE OF SIZES AND MODELS

There are 50 different sizes and models of Thor rotary air grinders . . . a model for any and every type of grinding job. All of the models can be furnished with either of the three throttle types shown. For full details, specifications, prices and delivery information, write for Thor Catalog No. 52B.

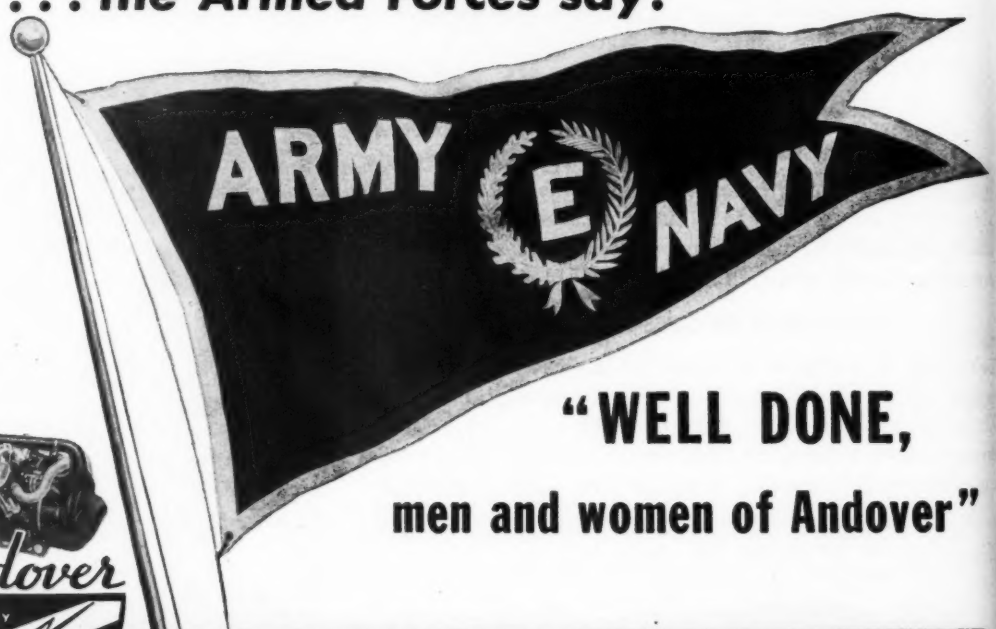

Straight Throttle
The straight throttle permits a constant flow of air into the tool without the necessity of keeping the lever continually depressed. The machine will not stop operating until the valve is manually closed. For grinders up to 4" capacity, riveting wheels, it is the most widely used handle type.
Grip Throttle
The grip throttle is the most desirable type for grinders of 6" wheel capacity and larger. It is adapted for overhead operation, for working in close and awkward places, and for work where a straight forward thrust of the machine is desired. On the grip handle, the throttle is self-closing when the trigger is released.
Lever Throttle
Safety is the primary feature of the lever throttle. The instant the lever is released the power is cut off. This automatic action is helpful in hazardous work on construction and maintenance, and reduces accidents due to carelessness.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Blvd., Chicago 6, Illinois
Los Angeles New York

Thor PORTABLE Electric & Pneumatic TOOLS
Branches in Principal Cities

FOR thousands of Auxiliary Units
generating the internal power for our bombers . . .

. . . the Armed Forces say:

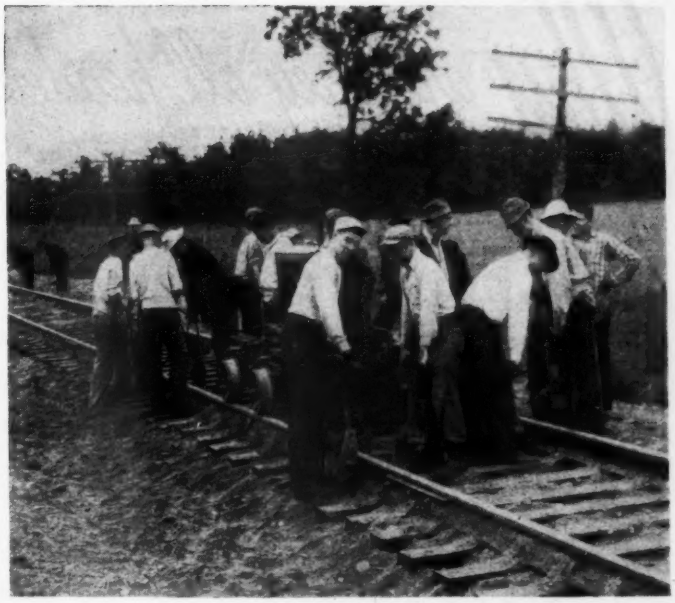


"WELL DONE,
men and women of Andover"

Andover
AUXILIARY
POWER

ANDOVER MOTORS CORPORATION • ELMIRA, N. Y.
WHOLLY-OWNED SUBSIDIARY OF ANDOVER KENT AVIATION CORPORATION

The "ROOKIES" LEARN QUICKLY



A group of high school boys operating JACKSON Vibratory Tampers on a large surfacing job of one of the leading railroads.

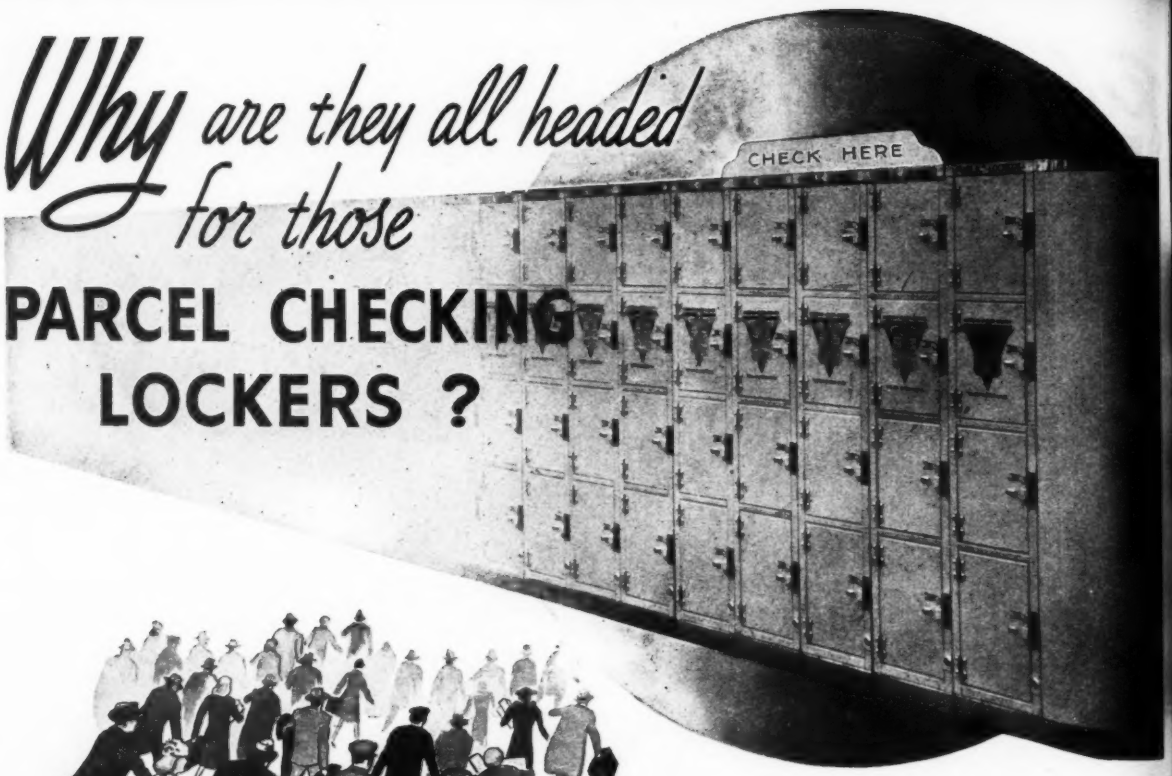
with JACKSON Tampers

In this day of manpower shortage when high school lads and any other inexperienced labor available must be resorted to, there's a double-barrelled advantage in using JACKSON vibratory TAMPERS. For, the weight of the machine, its unique vibratory action and the design of the blades all promote first class work with very little training of the operator. From Minnesota to Mexico and from coast to coast, in all vital areas, unskilled labor is operating JACKSON vibratory TAMPERS and making a noteworthy contribution to the track maintenance of many leading American Railways.

JACKSON Vibratory Tampers powered by JACKSON Power Plants can be used in all lifts, in all types of ballast, by the small user as well as the large operator as they are equally adaptable to small or large gangs. Write for literature describing this equipment and how to use it.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

Why are they all headed for those PARCEL CHECKING LOCKERS ?



Because they know how much more convenient, safe and speedy it is . . . just to place bags and parcels in locker, shut door, deposit dime, and take the key . . . millions not only now *prefer* locker checking — but by their very words and example demonstrate that they look upon this streamlined service as an integral part of modern transportation. Over 60% of parcel checking in rail and bus stations and terminals is NOW handled by self-service lockers. And the number of regular patrons keeps on rising. At no obligation we will gladly make special surveys and recommendations for locker installation, or confer regarding their inclusion in your plans for renovation or new building.

The Trend Is to Parcel Lockers

AMERICAN LOCKER COMPANY, Inc.

Executive Offices

211 CONGRESS ST., BOSTON 10, MASS.

DISTRICT OFFICES

BOSTON NEW YORK PHILADELPHIA PITTSBURGH ATLANTA CLEVELAND CHICAGO DALLAS LOS ANGELES

LOCKER CHECKING INCREASED FOUR-FOLD IN THE LAST THREE YEARS

Keeping Roadbed Maintenance ON-SCHEDULE

As the latest in motive power enables the Milwaukee Road to keep traffic running on-schedule, so, too, does Woolery equipment assist in modern track up-keep. Woolery Weed Burners effectively destroy undesirable roadbed vegetation, and Woolery Tie Cutters save many minutes and much labor in tie renewals.

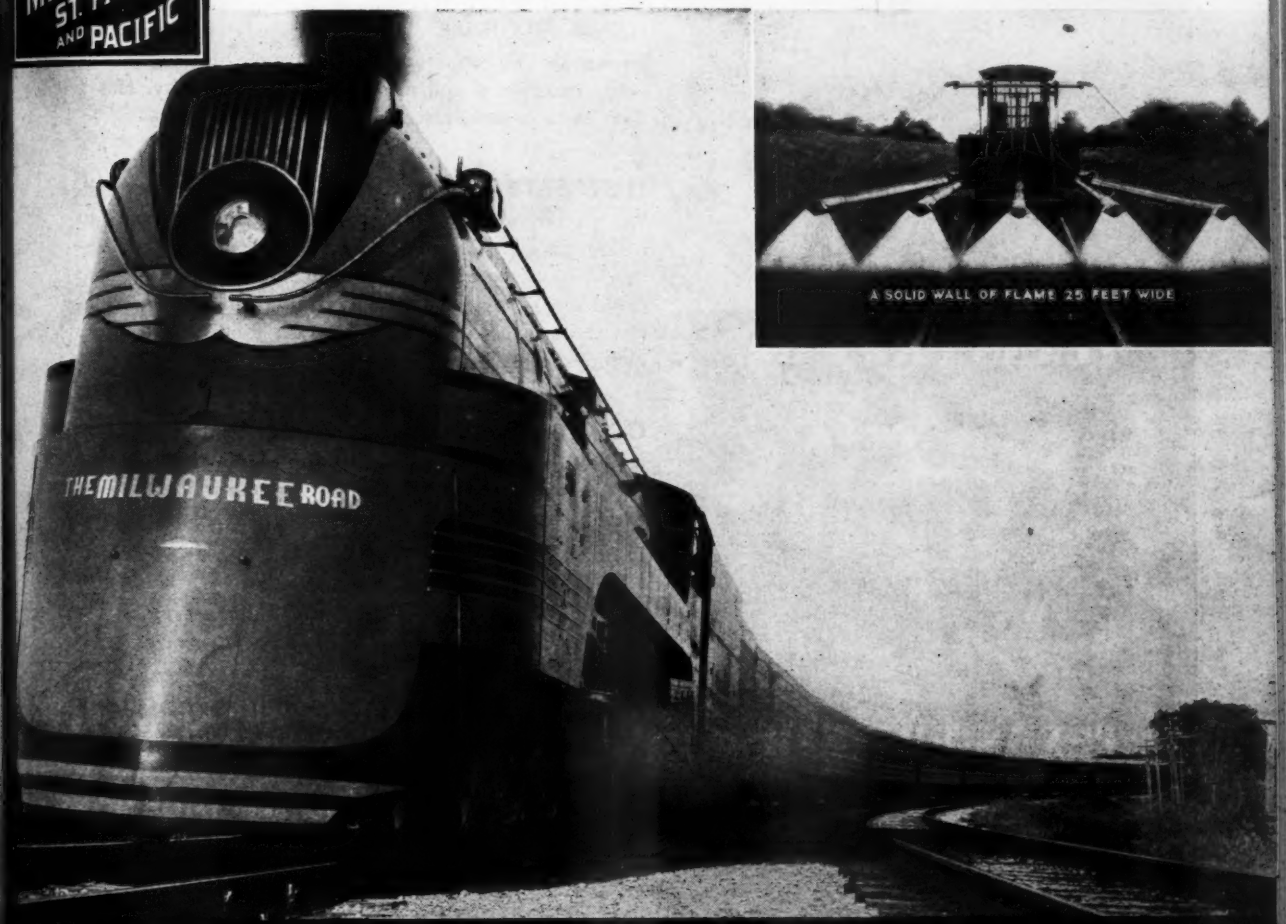
For better roadway maintenance, 75 other roads also use Woolery Equipment.

CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

WOOLERY WEED BURNERS

5-burner, 3-burner, 2-burner and 1-burner models available

A SOLID WALL OF FLAME 25 FEET WIDE



WOOLERY MACHINE COMPANY

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

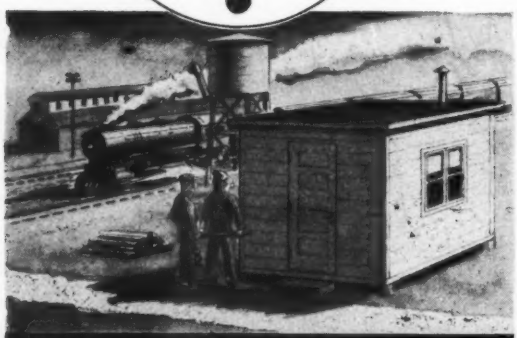
RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

Housing IN A MATTER OF *Hours* - NOT MONTHS!

That's TEXAS PRE-FAB's solution to railway housing problems. Housing when needed most urgently—*not* after it's too late. That's why you'll find hundreds of TEXAS PRE-FABs along lines like Santa Fe, Burlington, Southern Pacific, and Rock Island.

It will pay you to thoroughly investigate TEXAS PRE-FAB Housing. Following are brief descriptions of three types of TEXAS PRE-FABs for railroad use.



UTILITY BUILDINGS, 8' x 10'—ideal for watchmen's shanties, tool houses, handcar sheds, etc. Comes in 7 sections that two men can erect in a couple of hours. Just as easily demounted and moved to another locality. Has 1 door and 1 or more casement glass windows.

HOMETTES—Quick, comfortable residences for railway employees. Portability permits moving the house to follow the job. Also 16′ x 16′ TEXAS PRE-FAB Commercial Units of same basic design (in singles or multiples up to 96′ long) provide bunk houses for section gangs . . . commissary quarters . . . community wash room and lavatory facilities . . . material storage rooms.

COTTAGE HOMES—Permanent, comfortable, low-cost dwellings erected in a fraction of the time required for conventional construction. A big step toward greater employee satisfaction and its resulting increase in employee productivity.

For detailed information, mail coupon below.
Or 'phone us if we can be of immediate service.

TEXAS PRE-FABRICATED HOUSING COMPANY
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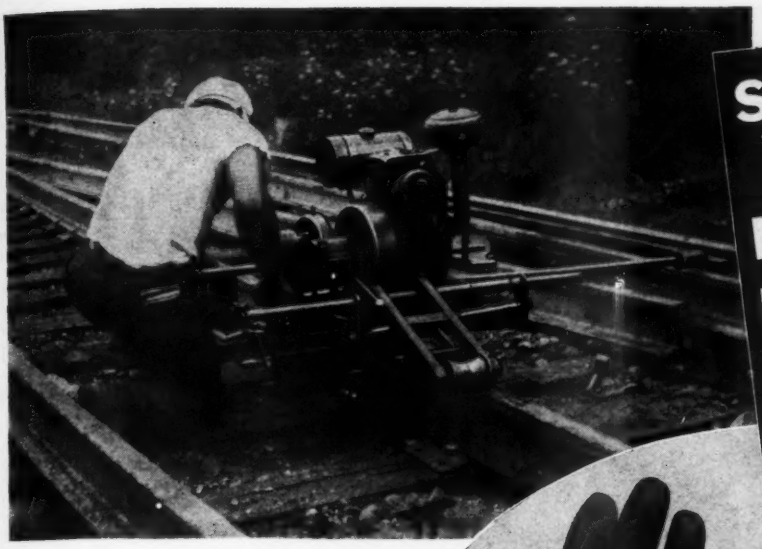
TEXAS PRE-FABRICATED HOUSING CO., Dept. F
Avery and Beckley Streets, Dallas 8, Texas

Please send full information, including prices and specifications on the following:
Utility Buildings ☐ Hometts and Commercial Units ☐ Cottage Homes ☐

Name_____ Title_____
Company_____
Address_____
City_____ State_____



SIMPLICITY of the NORDBERG RAIL DRILL appeals to all maintenance men

NO TOOLS NEEDED FOR THIS CHUCK

This simple, two piece chuck for holding the flat drill bit is evidence of the simplicity built into the Nordberg Rail Drill. No tools are required since the tapered chuck members automatically tighten in place. Chuck is removed with the tap of a hammer.

Deferred Maintenance Can Be Done Faster With Nordberg Power Tools

Rail Drill
Adzing Machine
Spike Puller
Track Wrench
Power Jack
Rail Grinders
Track Shifter

The Nordberg Rail Drill has the approval of maintenance men because of its simplicity. This machine is easily and quickly set up and operated by ordinary track gang labor. It is a one man machine readily transported along the rail with minimum of effort when moving from job to job. This drill is adaptable for drilling in close quarters at switches and guard rails. Wherever rail is drilled, the Nordberg Rail Drill will save time and cut the cost of drilling.

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

HUBBARD QUALITY ASSURES LONG LIFE

Hubbard Special Slim Pattern Alloy Track Chisels are tempered 2½" to 3" from cutting edge—no blacksmithing required — just sharpen when dull; likewise, heads need only regrinding when mushroomed.

Hubbard SUPER-STEEL Alloy Double Face Sledges are ground to 45 degree bevel to prevent shearing and causing of accidents from flying pieces—all Hubbard Track Tools are made to AREA specifications.

Hubbard & Company manufacture a complete line of SUPERSTEEL Alloy and High Carbon Steel Track Tools, Alloy Spring Washers and the Unit Rail Anchor.

New York Office
3712 Woolworth Bldg.
233 Broadway
New York (7), N.Y.

HUBBARD and COMPANY
Tool Division
Manufacturers of Alloy Spring Washers & Rail Anchors
6301 Butler Street
Pittsburgh (1), Pennsylvania

Chicago Office
Room 924
332 S. Michigan Ave.
Chicago (4), Ill.

Cooling Tower on Wheels

Completed Foster Wheeler built cooling tower car ready for coupling to rest of power train.

Cooling tower framing with outer sheathing partly applied. Note TECO Connectors are used for joining framing at corners and diagonals. Tower built by Foster Wheeler Corporation, New York.

A mobile power and light plant for use in war devastated areas was needed. General Electric Company engineers designed a mobile train to meet the situation. These trains are able to generate power independent of local sources of water, fuel or other necessities. Units of various capacities are built to meet local conditions. One type, the 3000 k.w. train, is equipped with three cooling tower cars with a capacity of 5000 g.p.m. A 1000 k.w. train has but one cooling tower car.

These cooling towers are pre-fabricated by the Foster Wheeler Corporation with TECO Connectors; match-marked, dis-assembled and shipped abroad, where they are quickly put together again.

In war work or in post-war planning, TECO Connectors play a vital part in timber construction jobs in all fields.

Watch for announcement of the newest TECO book—The Forest Industries Blaze New Trails.

TIMBER ENGINEERING COMPANY of WASHINGTON, D. C.

WASHINGTON • CHICAGO • NEW ORLEANS • SAN FRANCISCO

Specify **TECO**

CONNECTORS AND TOOLS

Endorsed by Leading Lumber Manufacturers and Fabricators

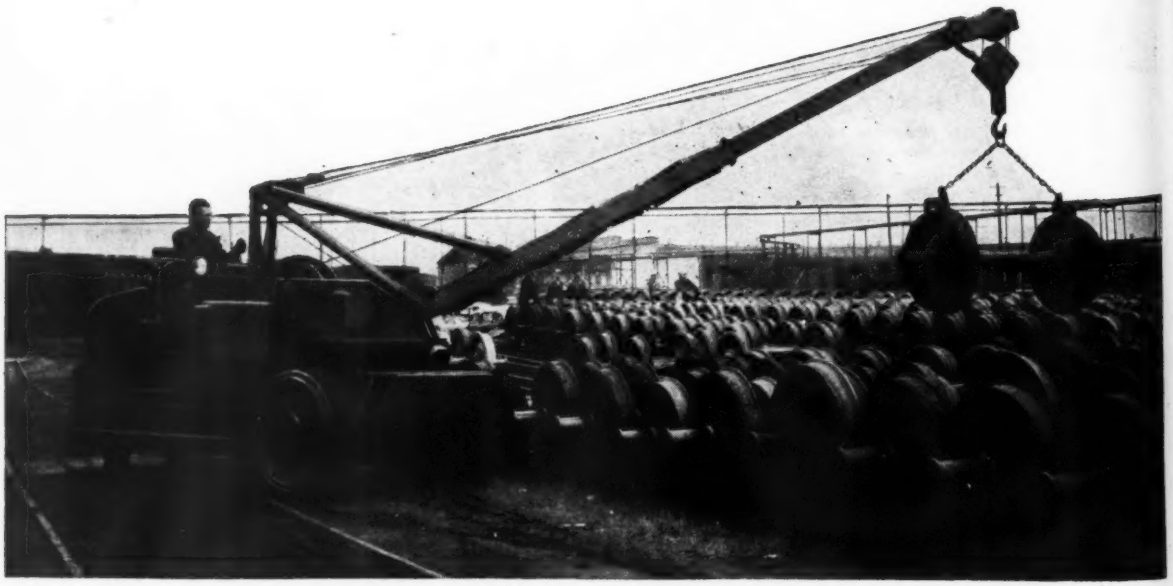
FOREIGN DISTRIBUTORS:

V. H. McIntyre, Ltd., Toronto, Canada • MacAndrews & Forbes, Ltd., London, England • Timber Engineering Company, Sydney, Australia Morie & Company, Ltd., Wellington, New Zealand • The Ford Company, Inc., Panama City, Panama • Standard Machinery & Supply Company, Mexico, D. F.

You'll Always Have Work for the LINK-BELT SPEEDER CARGOCRANE!

There are so many necessary jobs the Cargocrane can do, and do quickly, easily and efficiently, that it will be busy practically all the time! Loading or unloading cars, handling, moving or stacking material or even spotting cars, it is useful at yards and terminals as it is in car repair and building work, or in handling stores and supplies. Fast, powerful and nimble in close quarters, it is just what you've been looking for! Get details in bulletin 2033. Send for copy, today!

GET A POWERFUL LIFT WITH A LINK-BELT SPEEDER



For Prompt, Efficient, Convenient Sales and Service, There Is a Link-Belt Distributor Near You.

9074

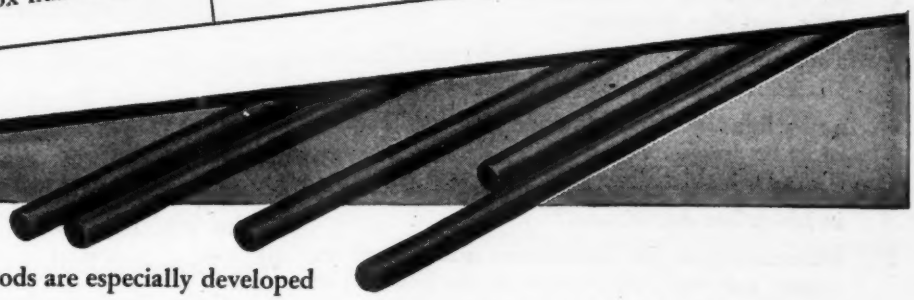
LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

OXWELD Supplies the Correct Rod for the Job

For These Jobs	Use These Rods	To Get These Results
Firebox sheets, frames, bolsters, cylinders	No. 1 High-Test Patented Steel Rod	High tensile strength Ductility
Building-up rail ends and other trackwork	MW Patented Steel Rod	Abrasion resistance High tensile strength
Signal and traction bonds	No. 19 Cupro Rod	Ductility Quick solidification
Aluminum sheet and castings	No. 23 Aluminum Rod	Rigidity High tensile strength
Cylinders and other iron or steel castings	No. 25M Patented Bronze Rod	Easy machinability Strength
Coach sides and equipment, dining-car equipment	No. 28 Columbium-Bearing Stainless Steel Rod	Corrosion resistance Ductility
Piston heads and other moving parts	No. 31T Patented Bronze Rod	Wear resistance Heat resistance
Couplers, draft gear, truck sides, piping, forgings	No. 32 CMS Patented Steel Rod	Superior tensile strength Ductility
Driving box hub faces	No. 39 Bronze Rod	Wear resistance Shock resistance



OXWELD welding rods are especially developed to make the best possible repairs on railroad equipment. The many kinds and sizes of OXWELD rods allow you to select the one that will give the most satisfactory results on each job.

BUY UNITED STATES WAR BONDS AND STAMPS

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

"MW" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

IT'S UP TO YOU TO HELP MAKE 2=3 WITH...

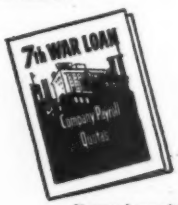
A job for seasoned executives—this 7th War Loan! Especially when we've got to make 2 war loans total just about as much as all 3 in 1944! Putting this over demands the combined and *continued* efforts of the "No. 1" men of American industry.

This means marshaling your plant drive to make every payday—from now 'til June 30th—do its share toward the success of the 7th. Directing the drive is not enough. It's equally important to check to see that your directions are being carried out—intelligently!

For example, has every employee had:

1. an opportunity to see the new Treasury film, "Mr. and Mrs. America"?
2. a copy of "How To Get There," the new Finance Division booklet?
3. a new bond-holding envelope with explanation of its convenience?
4. 7th War Loan posters prominently displayed in his or her department?
5. information on the department quota—and an urgent personal solicitation to do his or her share?

Remember, meeting—and beating—your highest-yet 7th War Loan quota is a task calling for "No. 1" executive ability. Your full cooperation is needed to make a fine showing in the 7th! Do not hesitate to ask your local War Finance Chairman for any desired aid. It will be gladly and promptly given.



If you haven't a copy of this important booklet, "7th War Loan Company Quotas," get in touch immediately with your local War Finance Chairman.

The Treasury Department acknowledges with appreciation the publication of this message by

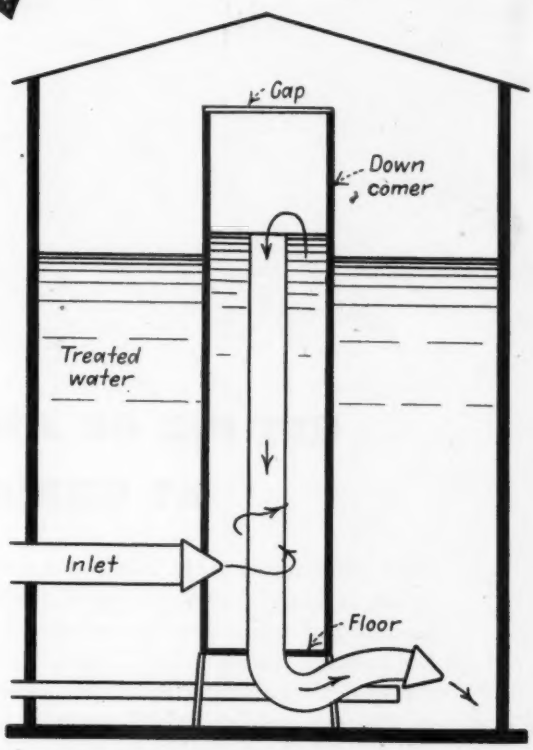
Railway Engineering and Maintenance

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

SNOWCO METHODS

Improve Existing Water-Treatment Facilities

No Head House and no outside piping at top of tank required.



1—Snowco's hydraulic mixing of the treating solutions and the raw water reduces mixing time to a minimum.

2—Snowco's proportioning equipment is highly accurate and can quickly be adjusted for changes in raw water.

3—Snowco's methods for reworking sludge insure absolute clarity with no trace of carry-over to foul supply lines, water cranes and engine parts.

4—Snowco's methods for sludge removal insure minimum waste of treated water.

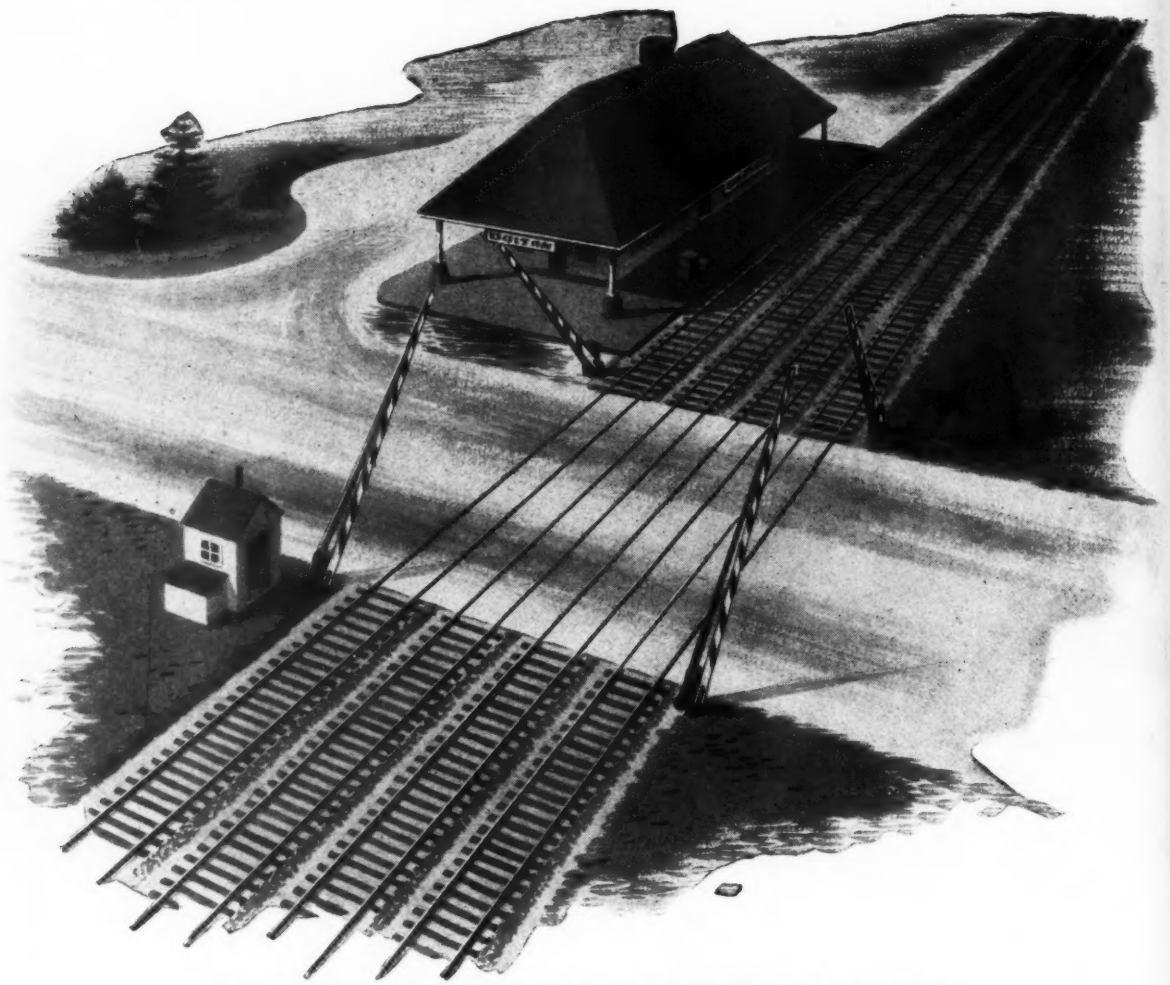
All of the above-mentioned Snowco refinements were developed in the field, and for this reason they can be applied readily to practically all types of water-treating plants now in use.

DIFFICULT WATERS OUR SPECIALTY

SNOWCO Methods can improve the results of your railroad's water-treating facilities

T. W. Snow Construction Co.

9 So. Clinton St. Chicago 6, Ill.



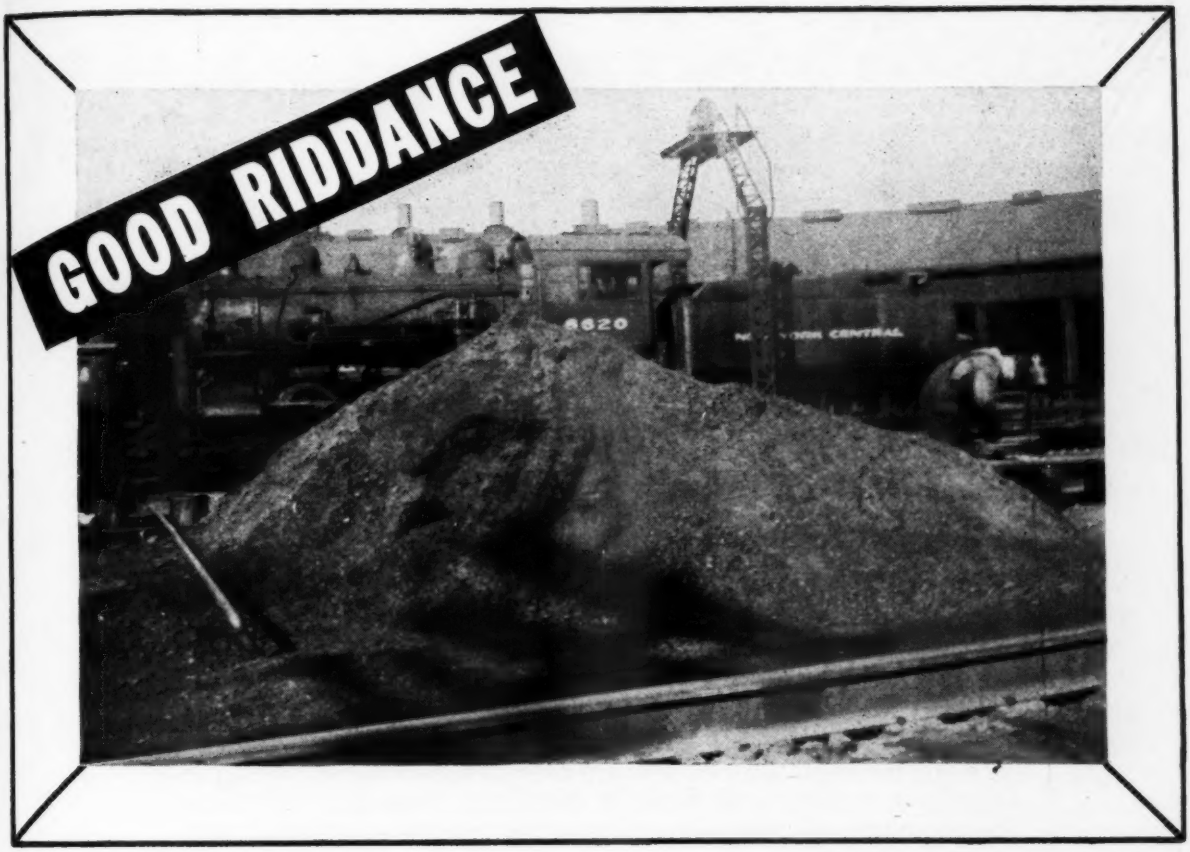
GET RID OF JOINT MAINTENANCE AT GRADE CROSSINGS

Why suffer the expense of repairing rail joints at grade crossings, paved streets, tunnels and other stretches where track maintenance is difficult?

Many railroads have found the answer in Thermit welding which converts the rail lengths into continuous track. They have used the process not only for these critical sections of track but for main line track as well, to eliminate joint maintenance, lengthen rail life and provide smoother operation of rolling stock.

Thermit welding is performed in four simple steps: lining up the rails, forming the molds, reacting the Thermit, cleaning and grinding the weld. The work can be done by your own crew after a brief period of instruction by Metal & Thermit supervisors. Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, South San Francisco, Toronto.

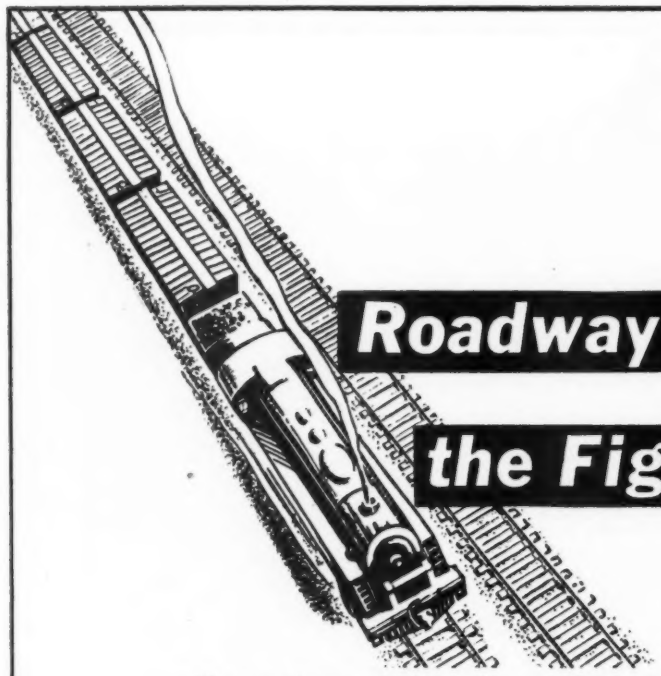
Thermit Welding



BUT—it took **SPECIAL TOOLS** and **EXPERIENCED ENGINEERS** to remove this dirt properly from an enginehouse sewer the first time.

PITTSBURGH PIPE CLEANER COMPANY HAS THE TOOLS, THE MEN AND THE EXPERIENCE TO DO A SIMILAR JOB FOR YOUR RAILROAD BETTER AND MORE ECONOMICALLY THAN ANYONE ELSE.

PITTSBURGH PIPE CLEANER COMPANY
433 Melwood Street Pittsburgh 13, Penna.

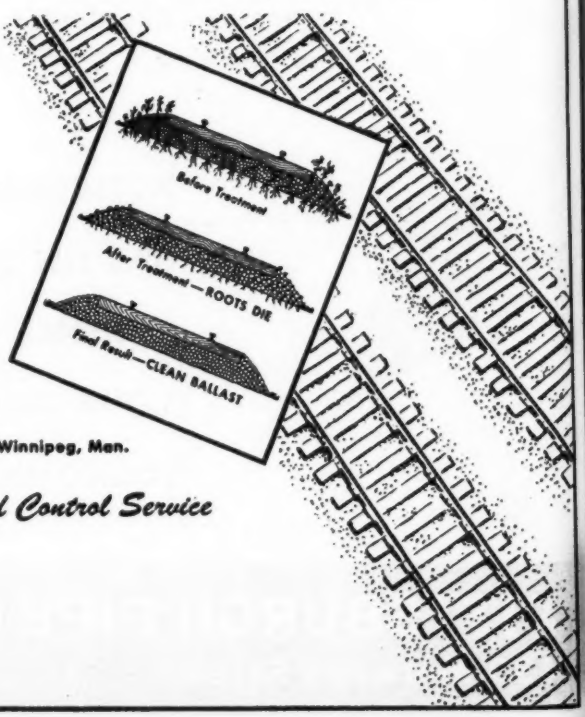


Roadways Leading to the Fighting Fronts

Down these vital roadways flows an endless stream of trains whose burden of fighting men and material is the very life blood of our war effort.

To you maintenance men who are keeping these roadways in such excellent condition, all credit is due. Your unceasing efforts are surmounting all difficulties. Every possible means of conserving manpower is required, and we are proud to contribute towards this accomplishment.

Today, our Atlacide and Atlas "A" Weed Killers are being used throughout the United States and Canada. This fact speaks for itself!



ATLACIDE
CHLORATE WEED KILLER

and

ATLAS "A"
ARSENICAL

CHIPMAN CHEMICAL COMPANY, Inc.

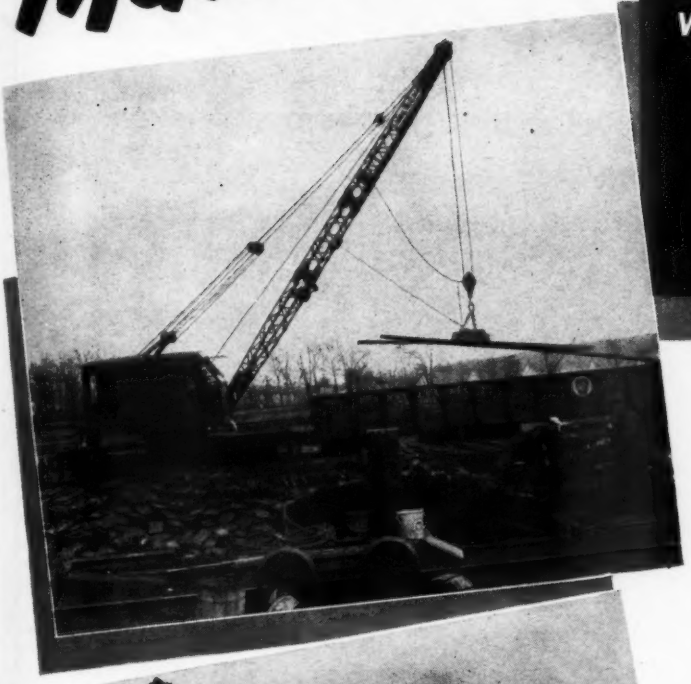
Chicago, Ill. • BOUND BROOK, NEW JERSEY • Portland, Ore.

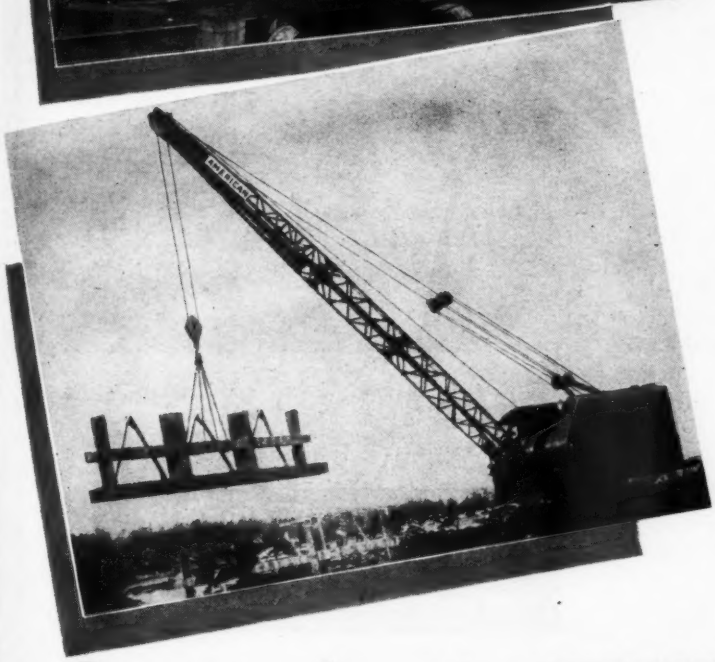
Houston, Tex. • Palo Alto, Calif. • No. Kansas City, Mo. • Winnipeg, Man.

Over Twenty-five Years of Weed Control Service

Materials Handling

with the AMERICAN LOCOMOTIVE CRANE





In any job of materials handling with hook, magnet, or bucket, the modern design AMERICAN Locomotive Crane will do more, faster. Speed, reach, capacity, ease and simplicity of control, and mobility are all built into this crane. It does its own hauling and switching, too. The use of old machines and other methods are costly and wasteful by comparison.

Under your jurisdiction is materials handling that can be done better, faster, and more economically with an AMERICAN Locomotive Crane. Now is the time to look into it.

4523

Plan now . . . but wait for **AMERICAN!**

AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

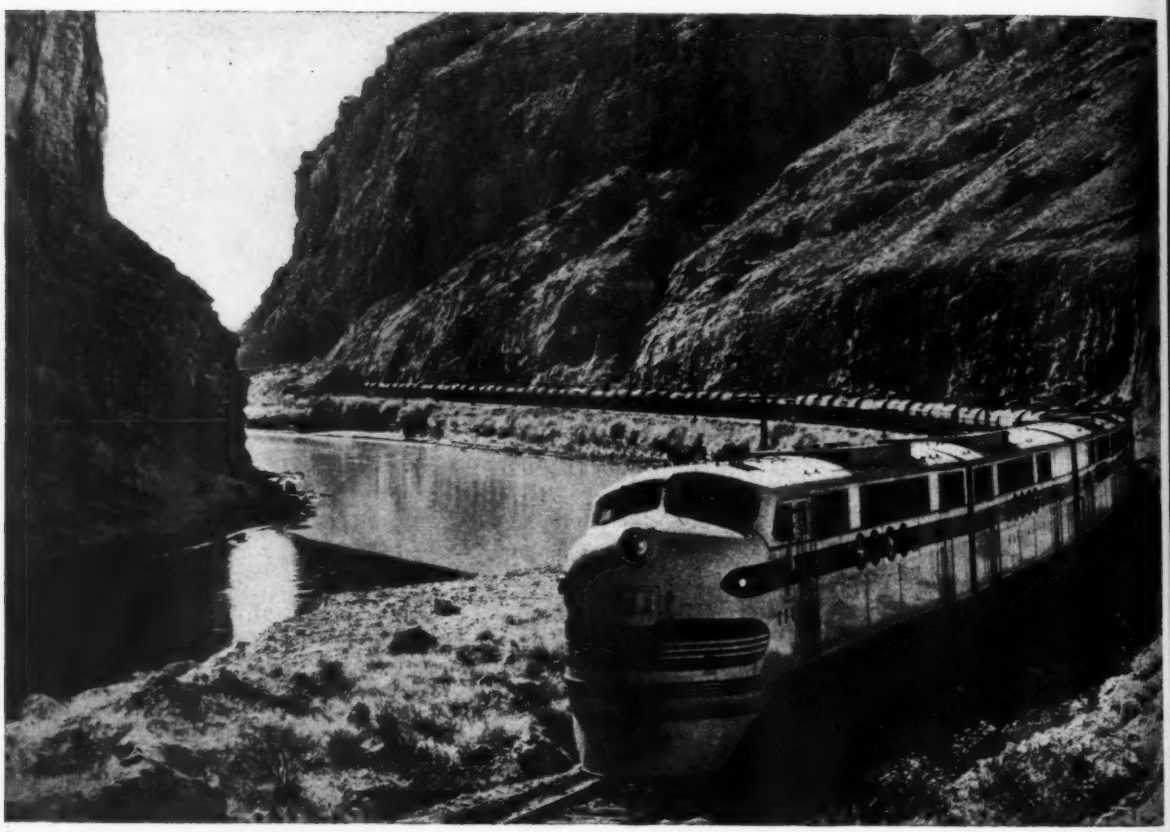
AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*

Compression Rail Anchors



For Economical Two-Way Holding of The Rail Where it is Most Needed

THE RAILS COMPANY

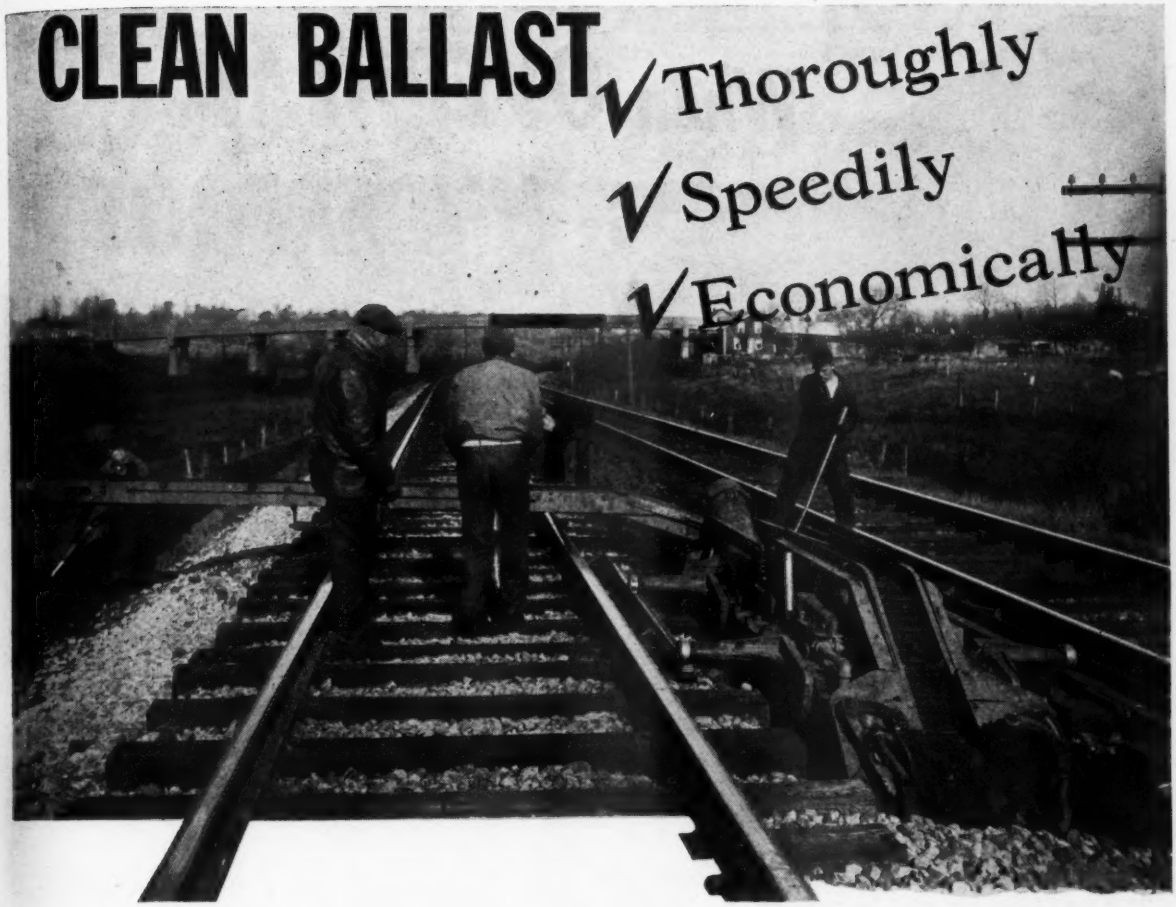
General Office

178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

CLEAN BALLAST

✓ Thoroughly
✓ Speedily
✓ Economically



McWilliams "Mole" Ballast Cleaner

New model Mole with increased capacity, more power and electric starting now available. Will clean intertrack ballast efficiently with track centers 13 to 15 ft.

McWilliams "Mole" Ballast Cleaners are available in border and intertrack models.

Write today for complete information.

RAILWAY MAINTENANCE CORP.
PITTSBURGH 30, PENNSYLNANIA

When OVERHEAD is UNDERFOOT...

It's a comfortable feeling . . .

To know that your overhead, underfoot, is under control . . .

To know that your flooring cost is low, and will stay low . . .

That your floors can stand heavy traffic, without undue wear . . .

That your floors are warm and shock-absorbent . . . help employees avoid fatigue.

That's why it's a comfortable feeling . . . when you walk across your Flintkote Mastic Floor.

Flintkote Mastic is *modern* utility flooring. It was designed and developed expressly for all industrial conditions from foot traffic to continuous steel-wheel trucking.

On station platforms, loading decks, stock car floors . . . anywhere you have heavy traffic . . . count on Flintkote Mastic Floors to give you long years of low cost service.

And a long shift on a warm, resilient Flintkote Mastic Floor is not as tiring as the same number of pounding hours on a floor that won't absorb shock.

That's a boost to employee morale . . . to customer comfort too.

You can cut maintenance and repairs to the bone with Flintkote Mastic. But if they do become necessary . . . the very characteristics of the Flintkote Mastic Floor make your cost surprisingly low . . . your job surprisingly simple.

Write for full information on the Flintkote Mastic Floor. Undoubtedly, your organization can use it to advantage.

FLINTKOTE INDUSTRIAL PRODUCTS

THE FLINTKOTE COMPANY

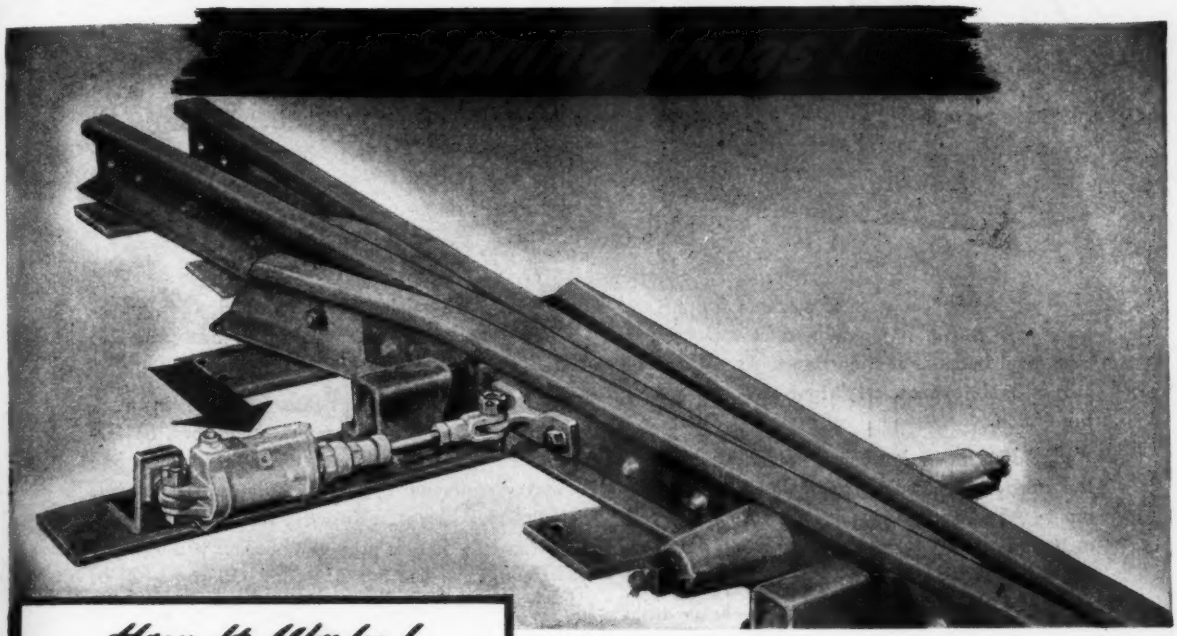
Industrial Products Division

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

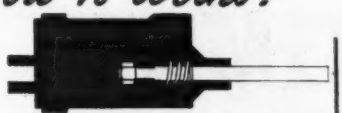
ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES • NEW ORLEANS • WACO • WASHINGTON • TORONTO • MONTREAL

PETTIBONE MULLIKEN

HYDRAULIC RETARDER



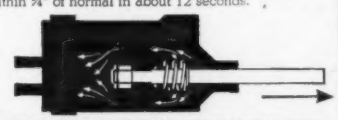
How It Works!



1 SPRING WING RAIL CLOSED, Hydraulic Retarder in normal position.

2 SPRING WING RAIL OPENS QUICKLY as wheel enters frog. Oil pressure behind moving piston opens valve, compressing valve spring. Oil flows rapidly to opposite side of piston through large openings.

3 SPRING WING RAIL CLOSES SLOWLY. Wheel has just left frog —spring has closed valve—oil is buffing return of piston. Oil flowing slowly through tiny slow return port permits piston return to within ¾" of normal in about 12 seconds.



4 SPRING WING RAIL CLOSING TERMINATES WITH A FINAL FAST RETURN to normally closed position. Piston has moved within ¾" of normal position—oil rushes through fast return by-passes permitting final split second slap against rail for sure positive closing.

SAVES WHEEL FLANGES
REDUCES BALLAST MAINTENANCE
INCREASES LIFE OF SPRING FROGS

Operates in a Straight Line · Only One Type and Size for All Rail Sections · No Need for Right or Left Hand Variations Rugged and Simple with No Small Complicated Parts · Easy to Dismantle, Clean or Repair · Easy to Maintain.

The Pettibone Mulliken Hydraulic Retarder for Spring Frogs was specifically designed to retard and cushion the slapping of the Spring Wing Rail between wheels of cars.

The required spring strength of the frog is so great that each time it functions it delivers a beating to the component parts of its own structure, loosening bolts and accelerating wear. Without retardation of the spring, each wheel must compress the strong spring. The initial blow to the wheel flange is substantial and occasionally damages, cracks, or breaks the wheel flange, permitting subsequent wheel failure.

When the PMCO Hydraulic Retarder is installed, the first wheel opens the wing rail; buffing of spring action begins, relieving the frog and the following wheel flanges of further repeated impact. When the last wheel of the train has moved through the frog, the Retarder permits return to normal position in about 12 seconds softening the blow to the frog structure.

Price **$40.00** *complete,* **F.O.B. CHICAGO, ILL.**

"Quality Since 1880"

PETTIBONE MULLIKEN CORPORATION

4710 West Division Street, Chicago 51, Illinois

Speedy "GANG CAR" Service

WHERE AND WHEN YOU NEED IT

The volume of wartime freight and passenger traffic is maintained at an unusually high level because section gangs do a thorough job of maintenance on "right-of-ways" around the nation.

And aiding them in their tremendous task are the sturdy and speedy gang cars like this Fairmont A5 Series C which is used to rush men and materials to areas where repairs are urgently needed.

Timken Bearings are used extensively in track motor cars just as they are on all railroad rolling stock because they possess all the beneficial characteristics so essential to this type of service. Timken Bearings carry radial, thrust and combined loads, minimize friction and wear, maintain wheel gauge, extend wheel and axle life and simplify maintenance.

When Timken Bearings are included in track motor cars and miscellaneous machinery, better-operating, faster-selling equipment results. See that the machinery you manufacture or buy is "Timken Bearing Equipped". Be sure the trademark "TIMKEN" is on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TAPERED ROLLER BEARINGS

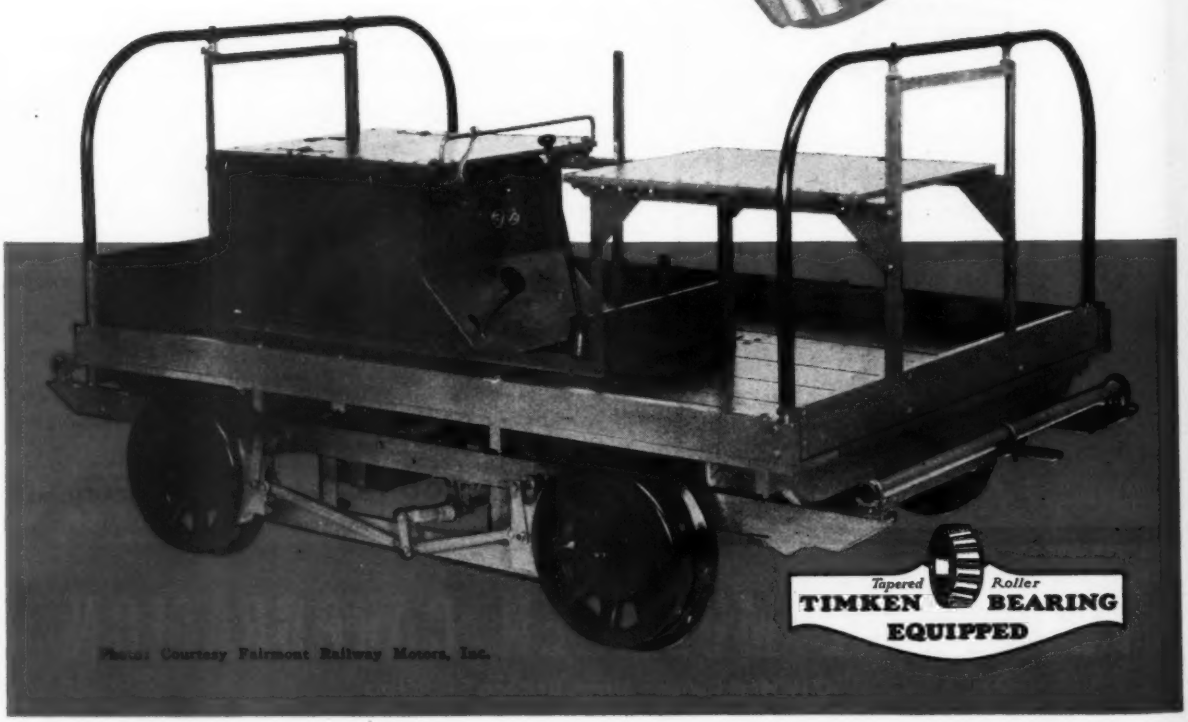


Photo: Courtesy Fairmont Railway Motors, Inc.

WE'LL BE READY

When Victory and Peace are assured WE'LL BE READY to furnish new and improved, dependable maintenance equipment. Our engineers and designers have built features into each unit which make it best for its specific use. More than 60 years of manufacturing experience has gone into the building of our maintenance equipment. May we send descriptive bulletins on items you need?

KALAMAZOO MANUFACTURING COMPANY
Railway Supply Division, Kalamazoo 24F, Mich. U.S.A.

MANUFACTURERS OF

MOTOR CARS
TRAILERS
PUSH CARS
INSPECTION CARS
DERRICK CARS
DISCER CARS

•

TRACK DRILLS
GAUGES, LEVELS,
SIGHTING BOARDS

•

ELECTRIC CROSSING
GATES

KALAMAZOO
Railway Maintenance Equipment

MANUFACTURERS OF MAINTENANCE EQUIPMENT SINCE 1883

SEALTITE HOOK BOLT

Double Life **SEALTITE HOOK BOLTS**

A *Greatly Improved* FASTENER

BUDA Trip Ratchet Type Jack Model No. 715—capacity 15 tons. Especially designed for track maintenance jobs. High, low, medium, all types.

EVERY BUDA jack shipped to you has been tested far beyond its rated capacity. This is your assurance of peak performance—one more reason why BUDA jacks are preferred throughout the railroad industry.

BUDA

BUDA Tie Nipper

BUDA Track Liner

15403 Commercial Avenue
HARVEY (Chicago Suburb) **ILLINOIS**

BUDA Rail Bender

BUDA Track Drill

He puts new "backbones" in tottering trestles

This maintenance superintendent on a main-line railroad rebuilds with ARMCO MULTI PLATE whenever a budget-eating trestle or bridge becomes unsafe.

It's easy to see why he relies on MULTI PLATE for new bridge jobs or replacements. Using these rugged structures, small bridges are relined or replaced in a few days, without interrupting traffic. Unskilled men can assemble the curved plates quickly, bolt them together, and then backfill. Any kind of headwall design can be used.

Learn how quickly you can repair or replace troublesome drainage structures with ARMCO MULTI PLATE. You'll be ahead on your postwar operations if you plan now on using MULTI PLATE in your modernization program. You can get all the facts from the Armco Railroad Sales Co. Incorporated, 491 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

MULTI ARMCO PLATE

Armco Multi Plate

A PRODUCT ORIGINATED AND DEVELOPED BY ARMCO ENGINEERS

DITCHING ALONG THE GREAT NORTHERN

Working in a narrow cut. No place to pile or push aside dirt. It must be hauled away. In the drainage-ditch operation pictured below, a "Caterpillar" Diesel D8 Tractor and 10-yard carrying-type scraper do the job handily — without interfering with traffic — and at low cost.

With only 45 cents' worth of fuel and a one-man "work crew," the outfit digs, scrapes, loads and hauls away 120 yards of dirt an hour. Distance — 300 feet. Number of loads — 12. Time per trip — 5 minutes.

Compare! Compare this speed, dirt-volume and operating cost with that of the usual work-train method.

Consider! Think of the many additional way-maintenance and construction jobs these simple, powerful, versatile and economical "Caterpillar" Diesel Tractors can do with but little further equipment. . . . Slope banks, build shoulders, widen or relocate road-beds, fill around culverts and bridge abutments, spread ballast.

Right-of-way, as well as rolling equipment, is taking a heavy war-traffic beating. Large-scale rehabilitation must begin soon. Discussing earthmoving equipment with your "Caterpillar" dealer should begin *now*.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

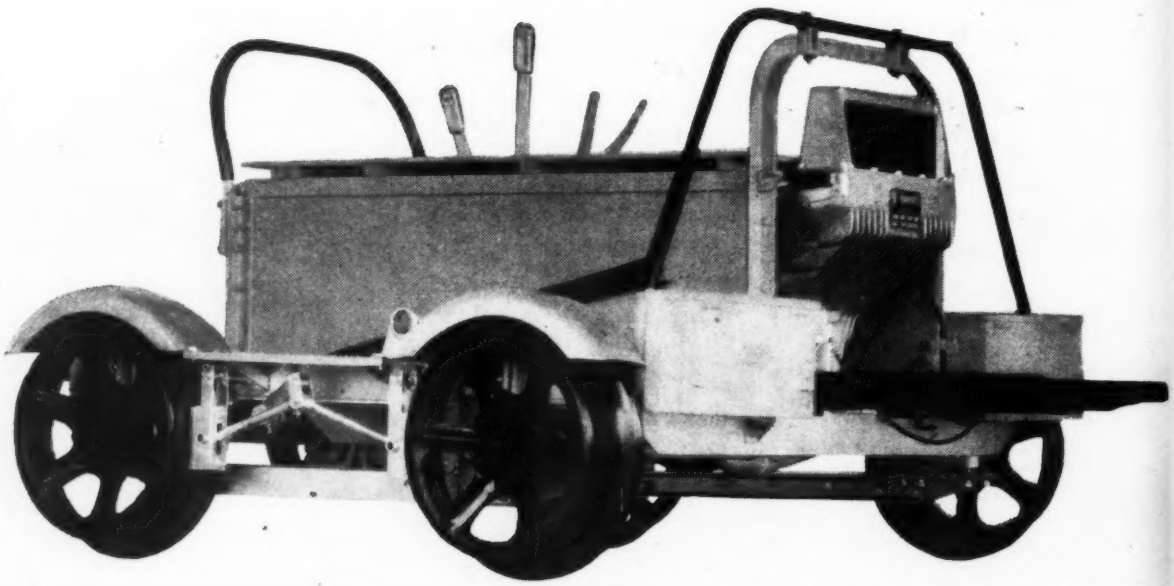
CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

NEW

ALUMINUM • • • ONE



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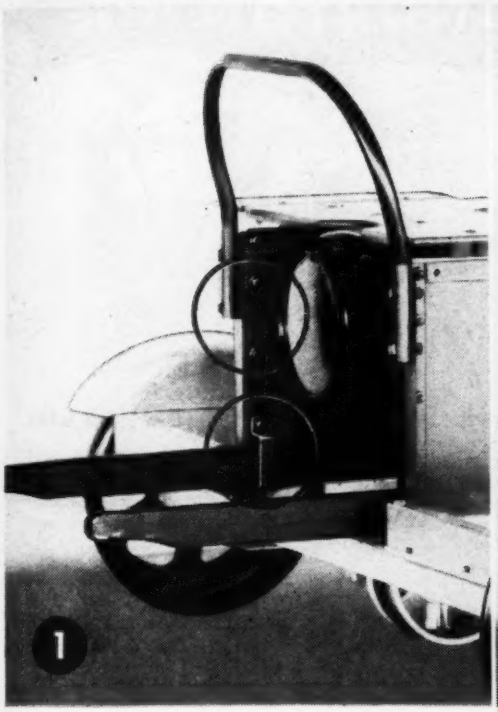

1

Adjustable lift handles on the new Fairmont M9 Series F permit the operator to place the lift handles at the position which suits him best for easy lifting. Photograph No. 1 shows the lift handles at LOW POSITION and the red circles point out the LOW and HIGH POSITIONS. Lift handles equipped with permanently secured safety stops.

2

Aluminum construction makes the Fairmont M9 Series F the ideal ONE MAN Car. It provides LIGHT WEIGHT without sacrificing car strength and the men who use motor cars daily know the value of Fairmont construction for riding quality, easy handling and efficient car performance.

3

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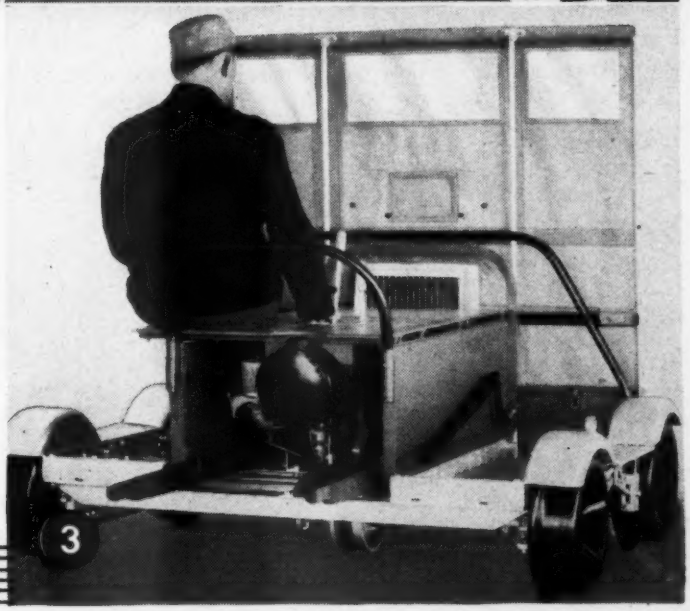

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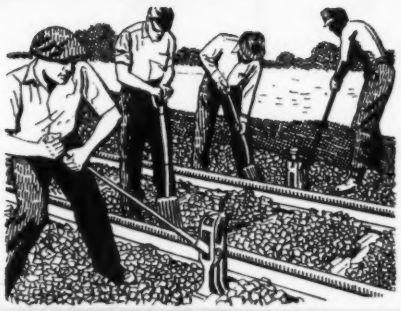

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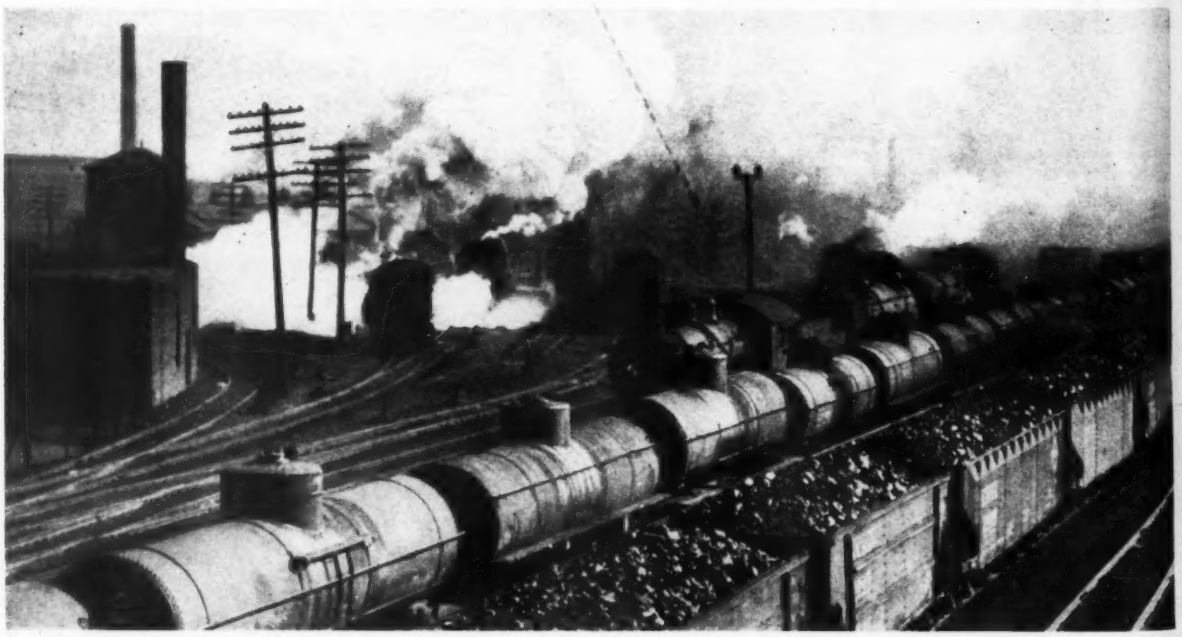

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No. 197 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Illustrations

May 1, 1945

Dear Readers:

As I have told you on previous occasions, this publication is being edited for you, to bring you currently up-to-date information about maintenance methods, practices and equipment—and in the way you want this information presented. Now, in the interest of achieving this objective, I raise one question and seek your advice regarding it.

Recently, it has been indicated by one reader, who purports to reflect the viewpoint of many, that Railway Engineering and Maintenance is open to criticism because its pages do not include more and larger illustrations; that because its articles are not always profuse with pictures to attract your attention, you are discouraged from reading them.

No one recognizes the value of appearance in a publication such as ours more than we editors do. The use of more and larger pictures, when warranted, both to improve appearance and to help you visualize readily the things described, has always been our goal. Today, however, operating under a severe paper shortage not of our making, which definitely limits the number of our reader pages, we have but two alternatives as regards the utilization of these pages—(1) to continue our present effort to balance illustrations and text in the interest of giving you what we think you want, or (2) to dramatize our pages by "blowing up" our illustrations at the sacrifice of many of the details as to methods, practices, equipment, organizations and results now normally included in our articles.

Maybe we are wrong. We know that your reading time is limited these busy days; we know that you appreciate appearance and that you value illustrations of adequate size and number to help you visualize situations adequately and readily; but we have not thought it your desire, in a working publication such as ours, that we sacrifice the "meat" of our articles, or the number of articles that can be included in any one issue, in order to achieve the last word in pictorial effect, largely for that effect in itself.

After you have read the first article in this issue on roadbed grouting on the New York Central, or any of the following articles, it would be extremely interesting to us to know whether you would have preferred more and larger illustrations at the sacrifice of the details contained in the text. With at least some of us, it appears to be a question of giving you the "beer" or the "froth". What do you say? This is your magazine, we want your advice.

Sincerely,

Neal D. Howard

NDH:KW

Editor

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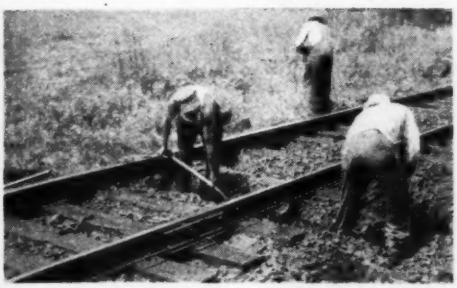

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DUTCH BOY RED LEAD

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

MAY, 1945

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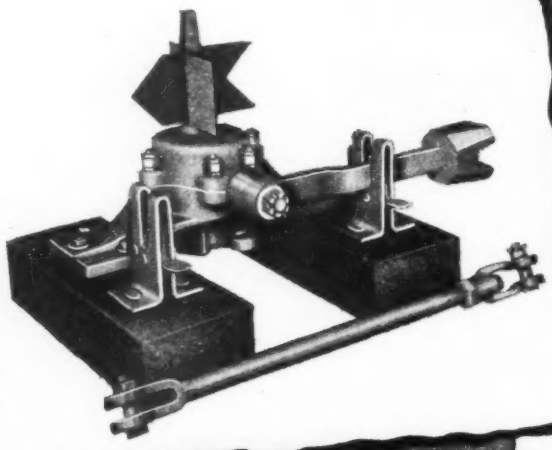

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Railway Engineering and Maintenance

April, 1945—

A Month of Jubilation, Sorrow, Achievement

April, 1945, will go down in history as a month of globe-shaking events—events that have had and will continue to have a profound effect on every man, woman and child in the United States—indeed, of the world. Listing these events, without regard to their chronology or any attempt to rate their importance, April, 1945, witnessed the surging of our armies across Germany to an historic junction with the Red armies and the virtual shattering of Nazi military might; it witnessed a continuation of our relentless drive on Japan, that has brought our Pacific armies and fleet almost to the door of its homeland, and our air power over every Japanese city; it saw our powerful Russian ally renounce its non-aggression pact with the Nipponese, with what forebodings no one knows, and the downfall of another Japanese cabinet; it recorded the passing of our President and Commander-in-Chief, Franklin D. Roosevelt, and the orderly succession of Harry S. Truman; and, as the month closed, it found official representatives of the United Nations meeting in San Francisco, dedicated to the task of laying the cornerstone of a world security order to settle future international differences and insure a lasting peace.

Truly, the last month brought occasion for jubilation and hope within the breast of every peace- and freedom-loving man, saddened only by the untimely death of our head of state and by the supreme sacrifice made by our heroes on every battle front, who gave their lives that the rest of us, and our children, might continue to live in a better world. No thinking man has overlooked the significance of these outstanding events and the impact which they are certain to have on the future, near and distant. Just as they brought jubilation and sorrow, so they brought renewed responsibility and cause for rededication to the tasks that lie ahead.

With a long and difficult war still to be won in the Pacific, to be followed by the huge problems of post-war readjustments within our country and abroad, these renewed responsibilities should be clear to every railroad man, from chief executive to section laborer. For them the job is far from completed, and without their continued loyal and untiring efforts, it cannot be completed.

Even with the final defeat of Germany, there is every indication that railway traffic will remain heavy, will shift its weight from eastward to westward, and that it will jump to unprecedented peaks on at least all western transcontinental lines. Anticipating this situation, reports received from a large number of roads indicate that expenditures for maintenance of way and structures in 1945 will reach an all-time high of $1,325,000,000, and giving credence to this indication is the fact that expenditures for these purposes during the first month of the year, the latest for which figures are available, reached $97,121,305, the highest for any January on record, and an increase of $7,618,057, or 8.5 per cent, over similar expenditures in January, 1944.

To date, there is naught but praise for the war record of the railroads. But how about tomorrow, the next day, until Japan is brought to its knees, and through the post-war readjustment period? How well they will meet the challenge in the days ahead—days that will witness new and continuously changing demands in the face of continuing shortages in their needs—rests largely in the hands of railway employees, among whom no group is more important than those in the maintenance of way and structures department. In this hour of march toward final victory, is there one in this department who will falter, who will fail to give his best to back up our fighting men and to hasten the dawn of peace?

Rail Failures—

More Effective Inspection Necessary

THE increasing number of train accidents during the last year as the result of rail failures suggest that today, under present heavy traffic conditions, more effective rail inspection is necessary than was required formerly under normal conditions. This is indicated pointedly by reports of these accidents, which reveal that at least some of them occurred in track which had been inspected regularly by both trackmen and rail detector cars. How many of the defective rails involved could have been located prior to the accidents with improved inspection is a matter of conjecture, but, it is evident that there is still considerable opportunity for improvement in inspection technique, especially on the part of the track forces, if the railroads are to maintain their present enviable standard of safe operation.

Obviously, to increase the effectiveness of rail inspection, at least from the standpoint of frequency, it is necessary that either the present number of men and equipment involved in this work be used more intensively, or that the number of each be increased so they may be used more extensively. Since the latter is impracticable, if not impossible, under the prevailing shortage of both men and machines, it appears that from the standpoint of frequency of inspection, the answer must come from the more intensive use of those men and machines available. Therefore, it should be the objective of every railroad officer responsible for the inspection of the track to secure the most efficient use of the men and equipment which are at his disposal for this work. To the extent that present traffic densities and speeds of operation result in more rapid rail wear and an increase in the number of rail failures of various types as compared with more normal conditions, it is necessary that additional testing time be made available for the rail detector cars and that trackmen become more efficient in recognizing and locating defective rails. To accomplish this, it is necessary to program carefully and intensively the operation of the rail detector cars, and to train the trackmen in the art of visual inspection to detect the presence of defective rails.

From the standpoint of the latter, there are several methods available for increasing the effectiveness of rail inspection. A workable plan may be by shortening the territory to be inspected by any individual, thus permitting more thorough and frequent inspection. A more effective method of obtaining better rail inspection by trackmen, however, and especially under the present shortage of man-power, is by the more intensive instruction of those men involved in the fundamentals of rail defects and their detection, thus making them more proficient in this work.

That many trackmen need more instruction, especially with respect to observation and interpretation of what they observe, is evidenced by reports of several accidents caused by rail failures which have indicated that considerable misunderstanding, misconception, and often inadequate knowledge of this subject, exists. Job or employee training courses provide excellent opportunities to familiarize trackmen with the various types of rail defects and method of their detection, and that such courses will pay dividends, even if they result in only a small proportional increase in the number of serious defects found, is indicated by the well-recognized fact that every seriously defective rail located in track and removed promptly, represents a large potential saving to the railroads.

Slow Orders—

To What Extent Are They Necessary?

ALTHOUGH slow orders have always been considered necessary, are necessary today, and probably will continue to be necessary for an indefinite period, the present generation of maintenance officers is developing a new viewpoint regarding them. In the past, there have been not a few disputes between trackmen or bridgemen and supervisory officers of the transportation department as to the necessity for many of the slow orders applied to track or structures, and particularly with respect to the maximum speeds that it is customary to allow with such orders.

Too often, slow orders that were not essential for the safety of trains, of the track or structures, or of the men engaged on the work, have been applied as a matter of convenience. Again, in numerous instances, slow orders that were essential to safety have been retained longer than necessary, and in others the limitations on speed have been too rigid. There has sometimes been some basis of excuse for the speed restrictions set, however, for engine and train men are prone to exceed the speed limits included in orders, and some of them have expressed the belief that they knew more about "what speed the track was good for" than the foreman who placed the slow order. Such a situation, however, is a strong indication of lax supervision on the part of one or both of the departments involved.

Today, high train speeds, the density and importance of traffic, and the extreme shortage of cars and locomotives, demand the elimination of interruptions to traffic and minimum delays to trains, making it essential to withhold slow orders wherever possible, and to avoid the stopping of trains, except in cases of emergency. This calls for a higher standard of maintenance than was required by the more moderate speeds of a few years ago, as well as more careful planning by those responsible for the work, before it is undertaken. In most cases, a considerable amount of preparatory work will be essential before anything is done to the track or structure.

To allow trains to pass at full speed over track that is being surfaced or over bridges that are being renewed or replaced, not only calls for better planning, but for better supervision of work than has been given in many instances in the past. Foremen and supervisors alike must be more alert and must watch closely every detail that might have a bearing on the safety of trains or workmen. Generally, this calls for the use of younger men whose habits of thought and action have not yet become rigidly fixed.

It is not intended to imply that all slow orders can be eliminated or that all trains can be permitted to pass without delays; for some classes of work it will be an impossibility to allow all trains to pass safely at full speed; in others, short interruptions to traffic cannot be avoided. What it is intended to make clear is that careful and in-

telligent planning and correct execution of the work will make slow orders unnecessary in many instances or permit the speed limit to be increased materially. Careful planning and good execution will also shorten the periods during which those slow orders that are necessary must be in effect.

Weed Control—

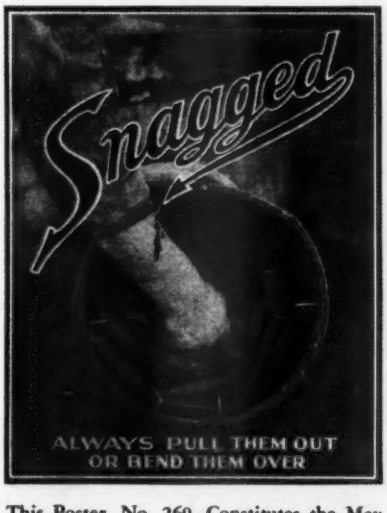
Is Essential to Economical Track Maintenance

TRACK maintenance men do not need to be told that weed control is an essential activity of their department. For many years weed eradication in one form or another has constituted a regular activity of the track maintenance forces, and as the conviction has grown that it is a necessary concomitant of economical track maintenance its application has been gradually broadened and intensified.

Along with this trend of events there has come a deeper appreciation of the economies of weed destruction, especially among higher officers in other departments, some of whom were formerly prone to regard it as somewhat in the nature of a frill, with little economic justification. Even in these quarters it is now generally recognized that the cost of weed control is amply justified by the resulting benefits in the form of reduced expenditures for ballasting, ballast-cleaning, tie renewals and other items.

Although the idea of weed control has gained general acceptance, it does not follow naturally that it is always applied in the most effective and economical manner. This can be accomplished only by careful study of the various methods of weed destruction available and their application in the light of the particular conditions encountered. Also, there are certain advantages to be gained by regarding weed-control activities as an integral phase of the maintenance program as a whole, rather than as something that is an end in itself, without any bearing on other aspects of track maintenance. For instance, at least one road has related weed control to other track work by operating ballast discers immediately ahead of its weed burners so that the plant roots that are exposed as an incidental result of the discing operation will be destroyed by the flames before they can have an opportunity to re-establish themselves.

Experts on weed control emphasize the necessity of starting such work early in the season while the plants are still small and tender. Some railroads in the southern sections of the country have already embarked on their weed destruction programs for 1945, and those in the northern districts will be starting soon. However, it is not too late to re-examine the policies now in effect with the thought of making any changes that may be found necessary to insure that the practices followed will be up to date in every respect.



This Poster, No. 260, Constitutes the May Installment of the "All the Year—Every Year Safety Program" of the Safety Section, Association of American Railroads

Switches—

Joint Inspection to Prevent Train Delays

INSTANCES are not lacking of the advantages of a close degree of inter-departmental co-operation on the railroads, but no better example can be cited than the practice followed on certain roads of requiring that all main-line switches in automatic block signal and centralized traffic control territories, as well as at interlockings, be inspected jointly by representatives of the track and signal departments. With such inspections being made at regular intervals, the respective responsibilities of the two departments in regard to switches are discharged in a co-ordinated manner to the end that needed adjustments or repairs are made before defects become sufficiently serious to result in unnecessary train delays by causing signals to present adverse aspects. Hence, this practice seems to merit careful consideration, especially in these days of heavy war traffic when the consequences of train delays are more serious than ever.

At power-operated switches in interlockings and in centralized-traffic-control territory the signal forces are responsible for the equipment that operates the switches and that which checks the position of the switch points. On the other hand, the track forces are responsible for the condition of the switch proper and the adjacent track. Since it sometimes happens that wear or maladjustment of the parts of the switch will prevent the points from closing properly, resulting in the signals being set against traffic, it is in the interest of both departments to assure themselves that the switches and all their appurtenances are in the proper condition and adjustment. The same reasoning applies with regard to hand-throw main-line switches in automatic block-signal territory.

In the absence of joint inspection of switches the occurrance of unnecessary train delays due to defects in them can easily result in considerable ill-feeling and acrimonious debate over the matter of fixing the responsibility. This can be avoided if the practice is followed of having representatives of both departments inspect the switches in the company of each other at regular intervals. One practice is for the signal maintainer and the track foreman to make the inspections at intervals of once a month, or perhaps twice a month. Another plan is for the roadmaster and the signal supervisor to make the inspections in the company of the signal maintainer and a trackman from each of the respective territories. If defects in switches are found during the inspections the necessary adjustments or repairs are made at once or arrangements are made to have them done.

Such co-ordination of the activities and responsibilities of the two departments is certain to pay handsome dividends in the form of a considerable reduction in the number of unnecessary train delays. Railroads not now following such a practice will find it worthy of careful consideration.

Injecting Grout. By Placing His Hand on the Hose, the Foreman Can Determine When Flow of Grout Ceases

Roadbed Grouting of Soft Track on

This article describes the experience of the Lines West of Buffalo in stabilizing 36,379 ft. of track during the last four years, employing the pneumatic method and a relatively rich sand-cement grout, and relatively small, flexible crews, 16 of which are being organized for the work to be done during 1945. Results cited show unstable conditions completely overcome, with marked savings over former maintenance costs and the complete elimination of speed restrictions due to soft track

CONFRONTED with many widely scattered sections of soft, unstable track due to a variety of wet sub-soil conditions, the lines of the New York Central System, west of Buffalo, have gone into roadbed grouting on a large scale, and are finding it highly effective and economical in correcting conditions that previously required frequent, periodic attention on the part of the track forces, not to mention the overcoming of generally poor riding conditions and frequent train delays due to necessary slow orders. To January 1, 1945, 197 soft spots or soft sections of track had been treated on the Lines West of Buffalo, having a total length of 36,379 ft., the work being done by relatively small gangs, employing a water-sand-cement grout, placed by the pneumatic method.

The future grouting program of the Lines West of Buffalo, as now contemplated, calls for the correction of conditions at approximately 1,200 additional soft spots of varying length in main-line track, all of which have already been investigated, and it is expected that it will also include an equal number of projects on branch lines. In addition, the Central, having found its grouting practice highly effective in stabilizing roadbed conditions in the approaches to bridges, preventing settlement of the track at these points, plans considerably more of this type of work in the future, on both main and branch lines. Sixteen outfits will be employed in the roadbed grouting to be carried out in 1945.

The soft spots in track on the New York Central, commonly called water pockets, are little if any different than those found in the tracks of all railroads, and occur in all types of roadbed sections, including deep cuts and high fills. The soil in the roadbed in these areas generally consists of soft clay, silt or other materials, which retain a large amount of water, with the result that it has a relatively low bearing capacity. Due to this lack of adequate carrying capacity, the track ballast is driven into the subgrade under the load and impact of traffic, sometimes to a considerable depth, resulting not only in the loss of ballast, but also in the creation of deep water-holding pockets, directly under the track, usually surrounded by impervious soil which will not permit the escape of the water. Where the natural ground-water level or the natural drainage level is above the low points of the pockets, as is often the case, the problem of drying out the roadbed is greatly increased.

Important Observations

Confronted with conditions of this character, extending over lengths of track ranging from a relatively few feet to several hundred feet, and dissatisfied with the results of earlier attempts to stabilize the track involved, the New York Central, in 1940, began an investigation designed to develop a permanent cure for the objectionable conditions. In this investigation it made sub-soil explorations of typical soft spots to determine the actual conditions prevailing and to be remedied. Six spots on the Toledo-Detroit branch, near Monroe, Mich., were selected for this investigation, and within the limits of each spot a series of test trenches, with the individual trenches 25 ft. apart, were dug across the roadbed and were carried down to sound, dry sub-grade material. All of the test cross sections were made after a six weeks' period of drought, during which time frequent periodic maintenance of the track had been required to keep it in good surface.

Several important observations were made from these test sections. In most cases the ballast had been driven deeply into the sub-soil and the sub-soil itself, directly beneath the pockets, was so wet and plastic that it oozed out between the fingers when compressed in the hand. There was no free water, however, in any of the pockets, which was a clear indication to the investigators that the draining of free water alone from the subgrade is not a complete cure for many unstable track conditions. It was also observed that the lowest point to which the ballast had been driven under the pounding of trains was invariably directly beneath the rail or just outside of its projected vertical center line.

Additional cross sections taken at a later date showed that the low points in the ballast pockets, beginning directly beneath the rail, may extend out as much as three feet beyond the ends of the ties. Where this extreme condition was observed, large bulges had

Slashes Maintenance New York Central

occurred in the embankment face, which, in turn, indicated invariably that the pockets had reached an advanced stage of development.

Initial Grouting

As a result of these investigations, it was concluded that the best way to remedy soft spots where the nature of the soil causes it to absorb and hold water, is to keep moisture from reaching the sub-soil in the ballast depressions. If the moisture supply can be cut off, it was reasoned, the pliable sub-soil will eventually dry out and become stable. On this premise, the Central turned to pressure grouting porous ballast pockets, both in an effort to prevent the further infiltration of water into the roadbed sub-soil, and as an aid in distributing the load of traffic over the softened depressions.

Its first grouting of this character was done in December, 1940, and involved the six sections of soft track near Monroe, previously investigated. Subsequent track grouting has consisted of the following: 1,647 lin. ft. at 13 locations in 1941; 4,907 lin. ft. at 31 locations in 1942; 11,882 lin. ft. at 69 locations in 1943; and 17,943 lin. ft. at 84 locations in 1944.

Throughout this work of the last four years, the general principles of the grouting procedure employed have not changed appreciably, but many modifications and improvements have been incorporated in the equipment used and in some details of the work. On the other hand, many other improvements in equipment have been prevented by war conditions, and the road looks forward to developing a number of these, either alone or in cooperation with equipment manufacturers, just as soon as conditions will permit.

Organization and Equipment

All of the grouting on the New York Central is based on the use of a relatively rich cement-sand grout, and application of the grout by the pneumatic method, employing relatively small special crews of company forces. Normally, a grouting crew consists of four to six men and a foreman. However, if long stretches of soft track are involved or the amount of grout to be applied is unusually large, two or more crews, each with its own equipment, are worked together. This latter arrangement speeds up the work and permits the shifting of the men from one crew to another as may be desirable in the interest of increased efficiency and greater over-all production.

The grout used in the work is a 1:1 mix, with enough water added to give it a soupy consistency. The sand is ordinary engine sand, screened through a No. 4 (¼-in.) screen. This mix produces a solid mass of considerable strength, ranging up to 2,500 lb. per sq. in.

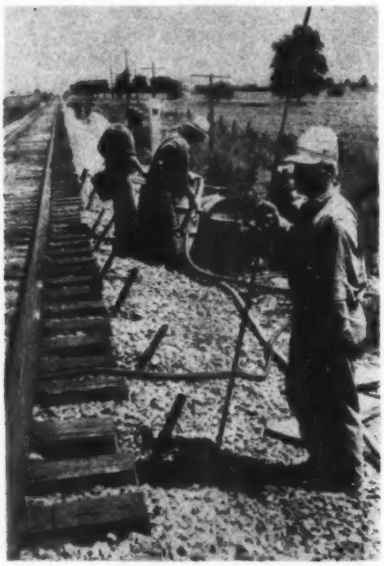
The equipment employed by the typical grouting crews, features of which will be discussed later in this article, includes the following:

Equipment Employed by Typical Grouting Gang

1 Air compressor
1 Combined grout mixer and pressure tank driven by an air motor
50 ft. of 1½-in. rubber discharge hose with fittings
20 Injection pipes, 5 ft. long, with collars
12 Injection pipes, 4 ft. long, with standard pipe threads at both ends
15 Injection pipes, 3 ft. long, with standard pipe threads at both ends
3 Nipples, 12 in. long, with standard pipe threads at both ends, and collars.
24—1¼-in. standard pipe couplings
2 Driving caps to fit injection pipes
Jackhammers—one or two according to size of gang, including air lines to operate them
1 Platform, 2½ ft. high
1 Ramrod for ramming out plugs
Metal plugs—⅞-in. scrap track bolts
1—¼-in. screen
1 Sand box—1 cu. yd.
1 Small water pump
1000 ft. of 1-in. water hose
5 Water barrels
1—600-gal. galvanized water tank
2—16-in. Stilson wrenches
2—3¼-in. "S" wrenches
3—12-qt. water pails
1 Underslung push car
1 Pipe puller
Spare fittings and parts, including two 1¼-in. unions

A Two-Crew Outfit Grouting the Roadbed Near Stevensville, Ontario. Compressors Are Not Shown

The air compressor normally employed in the grouting operations is a four-tool unit, of the type suited for spot-tamping work, with a rated capacity of 60 cu. ft. of air per min., at a pressure of 100 lb. per sq. in. This size unit, preferably with an off-track mounting, has proved adequate to supply air for the operation of the jackhammers and the air motor of the



A Series of Injection Pipes in Place, Ready to Receive Grout. Note Drive Nipples and Man Holding Ramrod

mixing chamber, as well as for forcing the grout into the roadbed. If of the off-track type, the compressor can be pulled along the track shoulder as desired, or loaded on a push car.

Mixing Tanks

The combined grout mixing and pressure tanks that have been employed in the grouting work have been made in the mechanical shops of the road from second-hand air cylinders from cars. Fundamentally, each mixer and pressure tank, which is mounted on its side on skids, has an internal horizontal paddle shaft with a series of eight staggered paddle blades; a six-inch charging opening on top, equipped with a quick-fitting screw-type cap; a one-inch air inlet pipe at one end near the top; and a 1¼-in. grout discharge pipe at the other end near the bottom. The paddle shaft is operated by a No. 3 or No. 4 air-drill motor, mounted outside of and at one end of the tank, and connected into the same air line that supplies air pressure to the tank. By a series of valves, therefore, the operator can mix a batch of grout, and then divert the air to the pressure tank and force the grout out through the discharge line to the injection pipes in the roadbed.

A proposed improvement over the present combination mixing and pressure tank is the use of a double-barrelled machine, with one tank mounted directly above the other—the top tank to be used alone for batching and mixing, and the lower tank, with a valve discharge into it directly from the top tank, to be used exclusively for forcing the grout into the roadbed. The chief advantage of this machine, which it is expected will double the output of the single-tank unit, is that mixing can take place simultaneously with the grouting operations, thus having a new charge of grout ready when the previous one has been forced out.

In this arrangement, both tanks will have paddles, although the primary mixing will be done in the top tank, and the paddles in the pressure tanks will be used only to keep the grout well mixed until it has been discharged into the subgrade. Both paddle shafts are to be operated by the same air motor, one direct and the other through a sprocket-and-chain mechanism.

Injection Pipes

The injection pipes in the equipment of each grouting crew, as shown in the foregoing equipment list, include 15 pipes 3 ft. long, 12 pipes 4 ft. long, and 20 pipes 5 ft. long. All of these are of 1¼-in. double-strength iron pipe. Note from the list that the 5-ft. injection pipes are each equipped with a drive collar, welded in place. The 3- and 4-ft. lengths, on the other hand, have standard pipe threads at both ends, and are used in multiples, with 1¼-in. standard type couplings between them, where pockets of a depth of more than 5 ft. are encountered.

A special driving head is provided for installing the 5-ft. injection points, which screw down tightly against the drive collars on these pipes to prevent batter of the end and distortion of the threads. For driving the 3- and 4-ft. points, alone or in multiple lengths, special 12-in. drive nipples are provided, which are coupled onto the ends of pipes to absorb any driving batter.

Normally, the driving of the first or second injection point indicates clearly the depth of the water pocket and dictates the length of the injection pipes to be used in any area. For depths up to 5 ft., the 3-, 4- or 5-ft. pipes are used, as necessary, to get to the bottom of the pocket. Where a depth of more than 5 ft. is required, a 3- or 4-ft. length is first driven, and, after the driving nipple has been removed, one or more additional 3- or 4-ft. lengths are coupled on and driven, depending upon the final lengths required.

To keep ballast and soil from entering the injection pipes while being driven, a metal plug, usually a scrap track bolt, is inserted in the lower end of the pipe, where it also acts as a driving point. Under the driving action, the plug remains in position until final depth is reached. Then, to open the end of the pipe, the plug is punched out into the sub-soil below the ballast pocket by means of a steel ramrod.

Several means of driving the inspection pipes have been employed, including sledge hammers, and a 25-lb. weight, with handles, mounted on a guide rod, but these methods are giving way to the use of a 75-lb. jackhammer, which has been found sufficiently heavy to drive the longest pipes, and yet not too heavy for two men to handle. Where necessary, the 2½-ft. high platform included in the equipment is employed to facilitate driving operations.

To remove the injection pipes as grouting at any point has been com-

A Specially Designed Pipe Puller Simplifies the Withdrawal of the Injection Pipes

pleted, a special home-made, rachet-type pipe puller is used, as shown in one of the accompanying illustrations.

When starting a grouting job, the machinery and materials are moved up to the site of the work and are unloaded along the roadbed shoulder, with the compressor, grout mixer, water barrels and sand box in an arrangement most convenient for operations. Immediately, enough injection pipes are driven along the track affected to permit continuous grouting the remainder of the day. This may involve from as few as three or four pipes where many batches of grout are required, to as many as 15 or 20

pipes where only a few batches are required at each point.

Normally, the pipes are spaced 5 ft. apart longitudinally along one side of the track. All pipes are started into the ballast approximately one foot beyond the ends of the ties, and, where soft spots of normal depth are encountered, they are slanted toward the track at an angle of approximately 30 deg. with the vertical. This location and sloping of the pipes brings their lower ends, when driving is stopped, at points beneath and slightly outside the rails. Where deeper soft spots or pockets are encountered, the driving angle of the pipes is reduced proportionately to within 15 deg. from the vertical, so that the lower ends of the pipes will in no case pass a point directly below the rail.

The depth to which the injection pipes are driven is determined by the resistance to the driving. When a pipe breaks through the solidified top ballast and enters a soft spot, there is an immediate decrease in resistance to the driving. Driving is then stopped and, using the ramrod, the plug in the end of the pipe is driven out into the soft sub-soil. Water is then forced into the sub-ballast under a pressure of 40 lb. per sq. in. to flush fine clay and silt particles away from the pipe and to produce a lubricating effect in the pocket for the free entry of the grout. If water is refused at the first attempt to inject it, the pipe is pulled up about six inches and a second attempt is made. If water is still refused, the pipe is further pulled in successive trials up to a depth of 2½ ft. below the bottoms of the ties. If water is still refused at this level, it is evident that the roadbed is without voids and that grout would also be refused. Therefore, the pipe is pulled and operations are advanced to the next injection pipe.

Batching

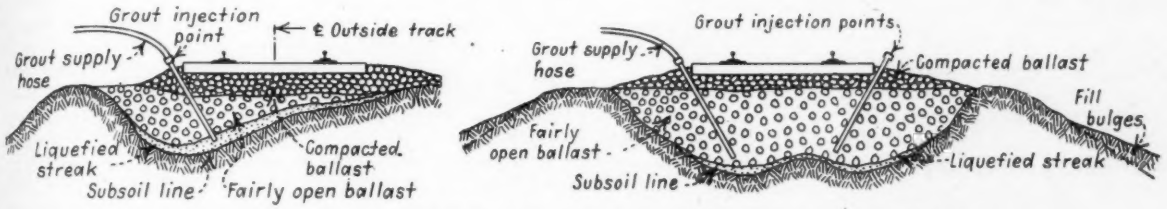
When ready to apply grout to the roadbed, all of the operations of the gang are carefully organized and synchronized so as to get the grout into place as soon as possible after being mixed. In the batching, the predetermined amount of water is first put into the mixing tank, followed by the cement. Then the sand is added, the top charging opening is closed, and mixing is started. While mixing takes place, which normally requires from 30 sec. to 1 min., the delivery hose connection is made to the injection pipe, so that the grout can be placed without delay. In fact, the greatest care is exercised against over-mixing, because of the tendency of the grout to set up. If mixing must continue for more than five minutes for any reason, it is wasted on the ground alongside the work, because it has been found that after more than five minutes in the mixing tank, sufficient set will have taken place in the grout to clog the discharge line, not to mention its decreased ability to permeate the voids in the roadbed.

Application of the grout is under an air pressure of 40 lb. per sq. in. Initially, pressures up to 70 lb. were tried, but these higher pressures caused a number of line plugs and blowouts in the ballast, and, it was found, did not force any more grout into the roadbed than the lower pressure adopted.

Successive batches of grout are applied through each injection pipe until further grout is rejected. Obviously, the amount accepted by different pipes varies, as does the distance the grout travels from the point of injection. To date, the quantity injected into individual pipes has varied from none to 50 one-sack batches.

Application of the grouting requires constant alertness on the part of the crew, and especially the operator of the pressure discharge tank, to take care of the many special contingencies that may arise. Often the grout travels along the track for considerable distances and may gush up through the pipes immediately ahead. If this occurs, the pipes thus affected are capped and grouting is continued to refusal. At times the grout may break through the shoulder at the ballast toe line, or even up through the ballast itself, between or below the ties. When such a break-through occurs, the grouting pressure is released immediately, and unless the rupture can be plugged successfully, further injection is stopped at the pipe involved.

Where a break-through occurs in the embankment, no harm is done, except for the waste which would occur if grouting were continued at that point. Break-throughs directly into the top ballast, on the other hand, would form hard spots in the track and make tamping difficult, if not impossible, so that where these occur, it



Cross Sections Show Locations of Injection Pipes for Different Types of Water Pockets

Preparing a Batch of Grout. A 1:1 Portland Cement—Sand Mix Is Used

is necessary to remove the grout after it has set to a sufficient extent to permit this to be done readily.

Furthermore, in connection with the application of the grout, it has been found necessary that the air pressure be shut off immediately after the last of each batch has cleared the end of the injection pipe. If this is not done, or the air pressure reduced,

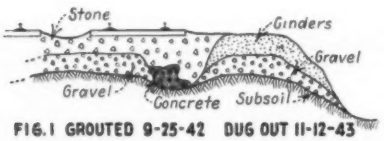


FIG. 1 GROUTED 9-25-42 DUG OUT 11-12-43

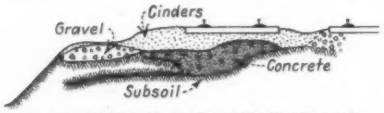


FIG. 2 GROUTED 10-12-43 DUG OUT 8-1-44

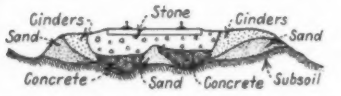


FIG. 3 GROUTED 5-10-41 DUG OUT 6-23-42

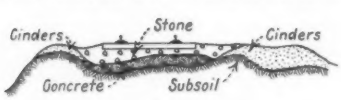


FIG. 4 GROUTED 1-12-42 DUG OUT 6-25-42

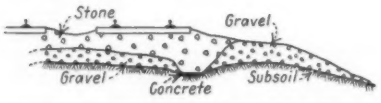


FIG. 5 GROUTED 9-10-42 DUG OUT 10-14-43

Test Cross Sections After Grouting Show How the Concrete Formations Seal Off the Soft Subgrade and Help Spread the Load Over It

reasonably soon after the last of the grout has been injected, the excess may cause a break-through in the embankment or upward through the ballast, with the possible loss of considerable grout.

Another precaution observed constantly during the grouting operations is against any excessive tendency for the track to heave. Heaving is permitted up to as much as one-half inch, but any tendency to exceed this amount is checked by stopping the grouting operations. Slight heaving is not considered objectionable, because it has been observed that the passage of the first train brings the track back to its original position. Furthermore, it is felt that this added pressure applied by the train forces the grout farther into the subgrade.

All of the roadbed grouting on the New York Central is carried out under traffic, without slow orders. Shortly after the completion of the work at any point, the track is surfaced out-of-face, the area treated is staked off to permit future observations of conditions, and records of subsequent maintenance costs are kept to permit their comparison with former maintenance costs. The actual cost of the grouting itself, as might well be expected, has varied widely with the different conditions encountered and, more particularly, with the amount of grout required, but to date this has averaged approximately $1.50 per foot of track.

Observe Results

To the present time, with the purpose of observing the character of the concrete formations produced by injecting grout into the subgrade, trenches have been dug across the roadbed at 16 locations. The cross sections included in one of the accompanying illustrations, all of which resulted from these observations, and which are drawn to scale, show the concrete formations found at a number of these points. The date on which the roadbed was grouted and the date that the cross section was taken are shown beneath each section; the average interval between these dates being about one year.

Section 1 shows the concrete beam formation found beneath the rail at one location, and Section 3 shows the concrete formations found beneath both rails at another location. These concrete beams, which are parallel to the rail and directly beneath it, act not only to stop surface water from reaching the sub-soil in the depressions, but also aid in distributing the load and impact of trains over a wider area.

The grout shown in Section 3 was injected into the sub-ballast from both sides of the track, while that shown in the other cross sections was injected from only one side of the track.

Sections 2 and 4 show slab formations approximately 13 ft. wide, these formations resting directly on the sub-soil and completely filling the depressions.

Section 5 shows a very small mass of concrete in the bottom of the soft spot. This small amount of concrete, which was only 3½ in. thick and 2 ft. wide, completely stopped all movement of the subgrade at this point.

To the present time, the results of the grouting on the Central, with a few minor exceptions, have been uniformly successful, both in improving track conditions and in reducing routine maintenance costs. Evidences of this are seen in the following information taken from a recent report of the road on its grouting operations.

Two spots, 117 ft. and 195 ft. long, respectively, that required maintenance at least three times a week, are located 1½ miles east of Lythmore, Ont., on the Canadian division. Maintenance costs at these two points prior to grouting averaged $122.64 and $126.32 per month, respectively. Following grouting, these costs were reduced, to an average of $3.10 and $14.60 per month, respectively. The cost of grouting these two soft spots was $165.12 and $135.76, respectively, which amounts are not much higher than the average monthly maintenance costs at these points prior to grouting. As a result, it is evident that the stabilizing of the roadbed at these two soft spots returned in savings the actual cost of the grouting in less than 1½ months. At the above mentioned rates of saving in track maintenance following the grouting, the work done at these two points paid for itself and saved the railroad a total of $2,474.24 during the first year. Succeeding years, it is thought, will probably show still higher savings as the subgrade continues to stabilize itself further.

Additional soft spots where grouting has produced an equal degree of improvement are located 1½ miles west of Stevensville, Ont., and near Lythmore, Ont., on the Canadian division; 1½ miles west of La Carne, Ohio, on the Cleveland division; and west of Hillsboro, Ill., on the Illinois division.

Thirteen soft spots were treated in 1941, four of which have not required maintenance since they were grouted. The four locations which have not required attention since grouting formerly required average monthly maintenance to the extent of $54.40. The average monthly maintenance expense for the other nine soft spots was reduced from $146.75 to $5.90. The total cost of grouting all 13 spots was $1,029.27. The total savings in maintenance cost for these same spots during the first year was $2,343.

Thirty-one soft spots were grouted in 1942, of which 13 have not required any maintenance to the present time.

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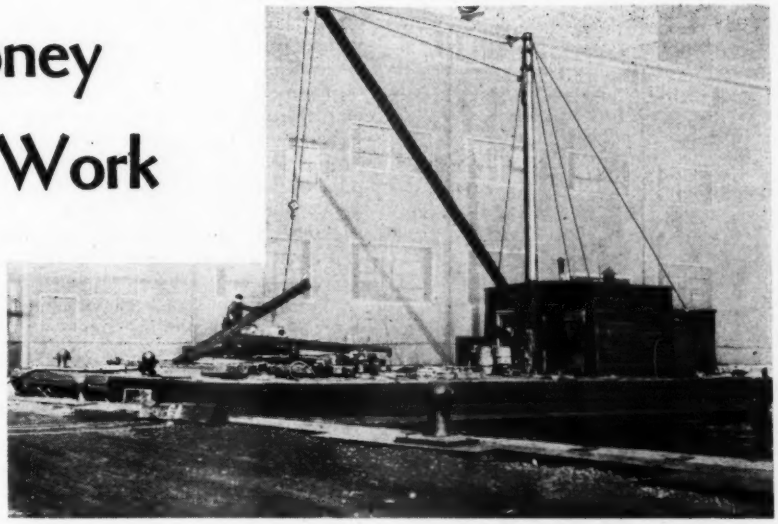
Summary of Grouting and Related Maintenance Costs New York Central System, West of Buffalo, 1941-1944, Inclusive

Year	Track Feet	Total Cost	Cost Per Lin. Ft.	Maintenance Cost Per Month Before Total	Before Per Lin. Ft.	After Total	After Per Lin. Ft.	Maint. Savings Per Mo.
1941	1,647	$ 1,029.27	$0.625	$ 201.15	$0.122	$ 5.90	$0.004	$ 195.25
1942	4,907	4,334.11	0.883	1,187.10	0.242	73.95	0.015	1,113.15
1943	11,882	16,898.69	1.422	2,308.33	0.194	151.19	0.013	2,157.14
1944	17,943	32,481.61	1.810	4,014.48	0.224	323.29	0.018	3,691.19

Floating Power Plants Save Money in Harbor Work



One of the Work Boats Making Repairs to a Dock Fender

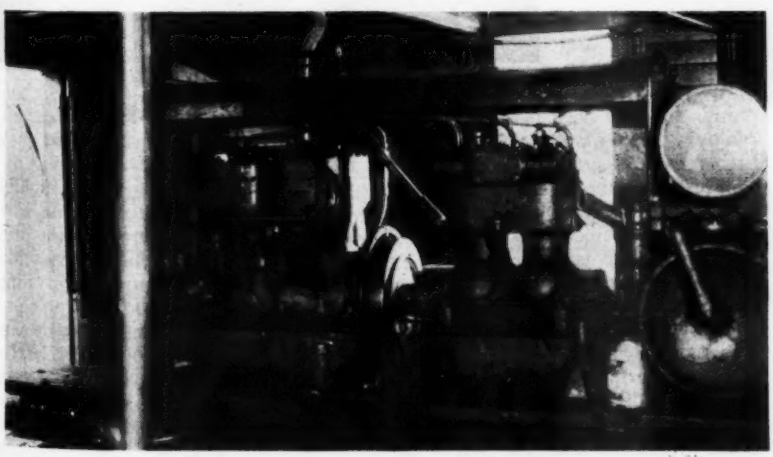
For a number of years the Erie has been maintaining its port facilities at New York with the aid of two work boats, each of which is equipped, among other things, with an air compressor for the operation of pneumatic tools. As related in this article, the use of these boats is producing substantial savings as compared with the former practice of using floating pile drivers as platforms for carrying out cutting and framing operations and related tasks

REPAIR, maintenance and renewal work on the Erie's extensive water-front properties in New York harbor is now being conducted with a much higher degree of efficiency and economy than formerly with the aid of two work boats, especially remodeled and equipped for this purpose. Placed in operation several years ago, these boats are fitted with air compressors, as well as certain other items of equipment, and are essentially floating platforms and power plants for the operation of a wide variety of pneumatic tools. It is estimated that the work that is done with these boats is now performed at a saving of 50 per cent as compared with the former practice of doing it from floating pile drivers.

Extensive Harbor Works

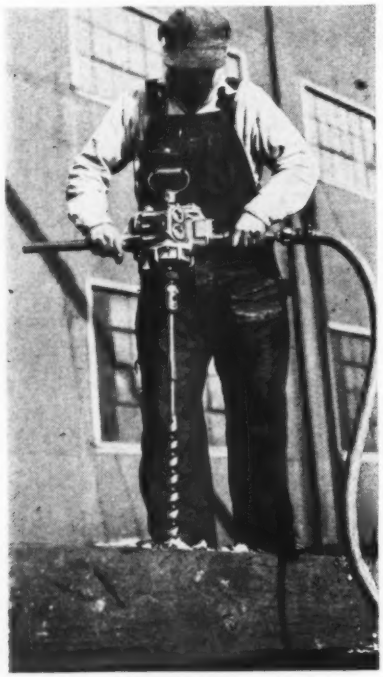
The eastern terminus of the Erie is at Jersey City, N. J., which is on the west side of the Hudson river, opposite New York. In connection with the ferry service that it operates for passengers between Jersey City and New York, as well as the necessity of handling freight across the river, both by lighter and by car float, and of transferring goods to and from cargo ships, the company maintains and operates extensive water-front properties. These include three ferry slips with bridges at its Jersey City station, two ferry slips with bridges at its Chambers Street station on the New York side of the river, five covered piers at New York, two float bridges in New York for transferring cars to and from car floats, three covered and three open docks at Weehawken, N. J., two covered docks at Jersey City, and three electrically operated float bridges at that point.

Certain parts of these structures are subjected to intensive wear and tear, such as the timber fender systems on the docks and the bulkheads between them, the float bridges, and the racks at the ferry slips, which are of pile and timber construction, necessitating periodic repairs. Another important item of work involved in the maintenance of the structures is the renewal of the timber floors on the docks, which are likewise subjected to severe service. In this connection, several of the company's waterfront structures have been provided with concrete or asphalt floors. Also, the pontoons under certain ferry and float bridges must occasionally be removed and repaired, a process that involves pumping water into them to free them from contact with the superstructure, and later pumping it out after the pontoon has been removed from under the bridge. Aside from these more important operations, the maintenance of the docks and other water-front structures entails a wide variety of miscellaneous tasks.



Air Compressor on One of the Work Boats

Much of the work performed, such as the repair and renewal of the fender systems and ferry racks, must necessarily be done with the aid of floating equipment. Floating drivers are used for the pile work, and formerly it was the practice to employ these units also as platforms from which



to carry on the lighter work, such as cutting and boring operations and the placing and bolting of timbers. Normally, the situation is such that this work cannot be done on the docks themselves and, hence, it is necessary to have a floating platform for this purpose. There were, however, certain disadvantages inherent in the use of the pile drivers for these tasks. For instance, it meant diverting this equipment and their crews to work that could just as well be performed by a smaller gang operating from lighter equipment. Another disadvantage was that the pile drivers do not have sufficient deck space to permit heavy framing and cutting work to be done on them, or to carry any considerable amount of material, requiring that other means, such as a "caddie" or raft, be employed for the latter purpose. Also, while the pile drivers have power hoists, the fact that they do not have booms is a handicap to the efficient handling of timbers and other material.

Several years ago the idea was conceived of using specially-equipped boats from which to perform much of the work, other than the driving of piles, that was then being carried out from the pile drivers. Aside from the objective of making it possible to do such work without tying up the pile drivers, a factor in originating this idea was the desire to bring to this work, which previously had been done largely by hand methods, the benefits and advantages of power-driven tools. At that time maintenance operations in general on the Erie were undergoing a process of rapid mechanization, and it was only natural that this movement should be extended to the upkeep of the waterfront structures. For this reason it was decided to provide the proposed work boats with power plants for operating mechanized equipment. Since the road had available a number of 160-cu. ft. compressors that had been replaced in the track department by larger units, the logical move was to use these as the power plants on the work boats.

The first boat to be equipped for performing repair work on the waterfront was a scow-shaped vessel with a length of 70 ft. and a beam of 21 ft. Originally this boat had been equipped with a number of steam-driven piston pumps and had been used largely for removing excess water from the holds of barges and car floats, but its function in this connection had been taken over by a portable gasoline-engine-driven pump which was found to do the work more economically.

To adapt the pump boat to its new function, the cabin, which originally had covered almost the entire deck, was reduced to a length of about 15 ft. at the stern, thereby making available a considerable area of deck space for accommodating material and for doing framing work. The steam boiler and all the pumps except one, a 6-in. unit, were removed. The one pump operated by compressed air, was retained for pumping out the pontoons on float and ferry bridges. Included among the original equipment on this boat was a mast with a 20-ft. boom and a steam-operated hoisting winch. These were not disturbed except that the winch is now operated by air. The 160-cu. ft. compressor, with the flanged wheels replaced with a skid mounting, was installed in the cabin which also houses the pump, the hoist and a stove for heating it in cold weather.

Shortly after the first boat was outfitted another vessel was similarly equipped. This was a covered barge with a length of 80 ft. and a beam of 27 ft. In adapting this boat, the enclosure was removed and replaced with a shed, 16 ft. long and 20 ft. wide, in which was installed one of the 160-cu. ft. compressors, a double-drum, air-driven hoist and a bilge pump driven by a gasoline engine. Also, a mast and a 40-ft. boom were installed, the need for the longer boom being indicated by experience with the 20-ft. boom on the first boat. Another item on the second boat is an auxiliary air reservoir consisting of a tank 3 ft. in diameter and 8 ft. high which was installed to provide a reserve supply of air to prevent the pressure from dropping when a heavy load is imposed on the compressor. Since neither of the work boats is self-propelled, tug boats are used for moving them from one location in the harbor to another. When it is necessary to move or shift them short distances when engaged on a particular job, this is done by handling lines to "nigger heads" and cleats on the piers.

Left — Wood Augers Are Among the Power Tools Used on the Boats. Right — Using an Impact Wrench

Chain Saws Are Used Intensively

It is not the practice to assign to each boat a permanent crew or to keep aboard them a full complement of power equipment. Rather the policy is to man and equip them according to the needs of each job, the men and tools being assigned from the regular bridge and building organization of the Erie's Terminal division, which is responsible for the maintenance of the water-front structures. Generally speaking, the work gang assigned to each boat consists of five men, including an assistant foreman and four carpenters.

The type of work in which the boats are most commonly engaged consists of the replacement of structural timbers and fenders up to 12 in. by 12 in. in size and the renewal of timber floors, and when engaged in such work each boat is equipped with a full complement of pneumatic wood-working tools, including a 24-in. chain saw, one or two boring machines, a 12-in. hand-held safety saw capable of making a 4-in. cut, an impact wrench, and a convertible tool that may be used either as a spike driver or a concrete buster. For burning off bolts when stripping ferry racks and fender systems, an oxy-acetylene cutting outfit is included. The normal complement of equipment also embodies a butterfly drill for use in drilling holes for anchor bolts in concrete bulkheads or deck walls. All this equipment, incidentally, is transferred from gang to gang on the division as required.

In operation, the work boats may follow behind the pile drivers, performing such timber framing and placement work as may be necessary in connection with the driving of the piles, or they may work independently, as when renewing dock fender systems or floors. In either instance they perform work that formerly was usually carried out from the pile drivers. In fact, it may be said that the work boats do everything that was previously done with the pile drivers, except, of course, the driving of piles, and that they do it more efficiently and economically.

The superiority of the work boats is due to a number of factors. In the first place they permit the work to be done without tying up the more expensive units of equipment with their larger crews, which usually consist of a foreman, an engineer and eight men. Moreover, the booms with which they are equipped permit a greater degree of flexibility and efficiency in handling heavy timbers and holding them in position while bolts are applied. Also, the deck areas are such as to permit framing work to be done on them and to allow the transportation of all necessary material needed in the work. Because of these considerations, and the fact that the work is now highly mechanized, a saving in labor of approximately 50 per cent is being realized.

Other Tasks

Aside from the wood-working operations for which they are most generally employed, the work boats are used on occasion for a variety of other types of work. Among these is the operation of paint-spray outfits. The equipment assigned to the Terminal division includes a number of self-contained paint-spray units, but these are limited in capacity and, moreover, there are many locations in the water-front structures where the operation of equipment powered by gasoilne engines is not permitted. In such locations, or where an extensive amount of painting is to be done, the work boats have been used successfully for operating paint-spray guns.

An example of this application is provided by a project involving the painting of the entire interior of a large enclosed pier used for handling fruit shipments. This pier, the superstructure of which consists of a steel frame covered with corrugated metal siding, is 131 ft. wide and 853 ft. long, and also includes a bulkhead shed, continuous with the main pier, which is 160 ft. by 275 ft. in plan. Four spray guns, driven by air supplied by the compressor on one of the work boats, were used to paint the interior of this structure. Preliminary to this work, all the surfaces to be painted were washed down with hose streams fed from the pump on the work boat. To carry out the painting work, the work boat was simply moored alongside the pier and air lines were used of sufficient length to reach entirely across the structure. Because of traffic conditions this painting job had to be done at night and on Sundays, and required about four months for completion.

On occasion the work boats have also been used to furnish air for the operation of riveting hammers and allied tools in connection with renewal and repair work on steel structures along the water front. On these occasions the boats are loaned to the department of structures, which handles such work on this road. In still another instance, involving the replacement of a timber floor supported on steel I-beams, one of the boats was used to furnish air for the operation of chipping hammers and wire brushes for cleaning the beams preliminary to painting them. It is apparent, in other words, that the advantages inherent in the work boats are such as to adapt them to a wide variety of different tasks, especially those requiring the use of compressed air.

The work boats were developed under the general supervision of I. H. Schram, at the time engineer maintenance of way of the Eastern district of the Erie at Jersey City, and now chief engineer maintenance of way of the system at Cleveland, Ohio. They are operated unter the general direction of C. K. Scott, now engineer maintenance of way of the Eastern district, and under the direct supervision of P. Sobbott, division engineer of the Terminal division, and Manley Smith, master carpenter, all located at Jersey City.

Track Motor Cars—What Kind

Modern Motor Cars Are Available in a Variety of Types to Satisfy the Many Transportation Needs of the Maintenance Forces

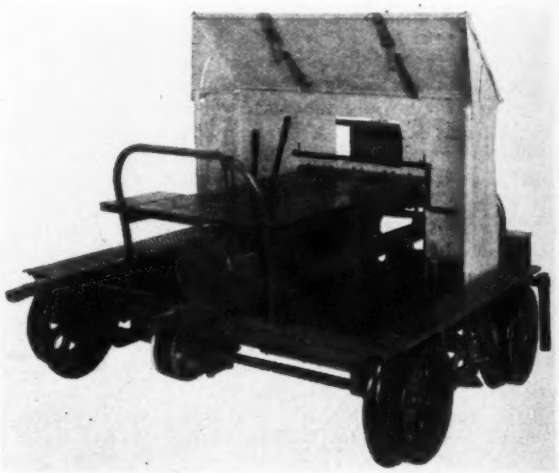
BY G. R. WESTCOTT

Assistant Engineer, Missouri Pacific Lines

St. Louis, Mo.

MOTOR CARS are used for many purposes in maintenance and construction work and also in inspection service. This variation in use makes necessary various sizes and types of cars. To aid in the selection of a car that is adapted for a specific service, it is desirable that they be classified as to size and capacity; this is done most conveniently by designating each class or group by the service in which cars of that type are used most commonly. Any such classification is more or less arbitrary, for a car that is classified in one group may often, through convenience, availability, or other local condition, be used in a service that usually calls for a car in an adjacent group. The range of requirements is such that cars must be built that vary in capacity and size from those suitable for operation by one man to those capable of handling large gangs. While the line of demarcation between groups is not clearly defined, greater economy and more satisfactory service will generally be secured if each car is used in the class of service for which it was designed.

Motor cars may be classified in six groups: (1) one-man cars; (2) light inspection cars; (3) light section cars; (4) standard section cars; (5) heavy-duty cars; and (6) party inspection cars. The first five of these groups are suggested by the American Railway Engineering Association and include those cars that are used most commonly as work cars; that is, they function more or less directly in the doing of work by maintenance or construction forces. Cars in the sixth group are involved less directly in the doing of work, being used most commonly for the transportation of officers over the line.



A One-Man Motor Car with Windshield

One-Man Cars

The one-man car is designed for the use of signal maintainers, telephone and telegraph linemen, supervisors, track inspectors or patrolmen, and other employees whose duties are such that they commonly travel alone. As such a car must be handled by one man, it is necessary that it be built as small and light as possible, but it must still have seating capacity for one or two additional men and adequate strength to carry such an additional load. The space for tools and other equipment is limited, but must be adequate for such tools and supplies as are required by the workman using it. The engine usually has a single cylinder and may be either two or four cycle. The power, ranging from 4 to 6 horsepower at a speed of 20 m.p.h., is transmitted to the drive axle by belt, clutch and chain, or friction drive and chain. Cars of this type usually weigh from 500 to 600 lb. and are equipped with 14-in. wheels.

Light Inspection Cars

The light inspection car is slightly larger and 60 to 100 lb. heavier than the one-man car. It is similar in construction but has a seating capacity for four men, although designed for the use of two. It also has a slightly larger tool tray space. This type of car is widely used by small inspection or engineering parties, by car repairmen, and by water service and bridge and building repairmen on jobs requiring not more than three or four

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# of a Car?

No. 2 of a Series

This is the second installment of the series of articles on the selection, care and operation of track motor cars appearing serially in *Railway Engineering and Maintenance*. In it, the author considers motor cars from the standpoint of six classifications, ie., (1) one-man cars, (2) light inspection cars, (3) light section cars, (4) standard section cars, (5) heavy-duty cars, and (6) party inspection cars, and then discusses the general and desirable features of the cars in each group, giving special consideration to the factor of weight. The next installment of this series, which will appear in the July issue, will discuss how a motor car is built

men, and for other similar purposes. The engine is often of the same size and type as in the one-man car, and the car usually has 16-in. wheels.

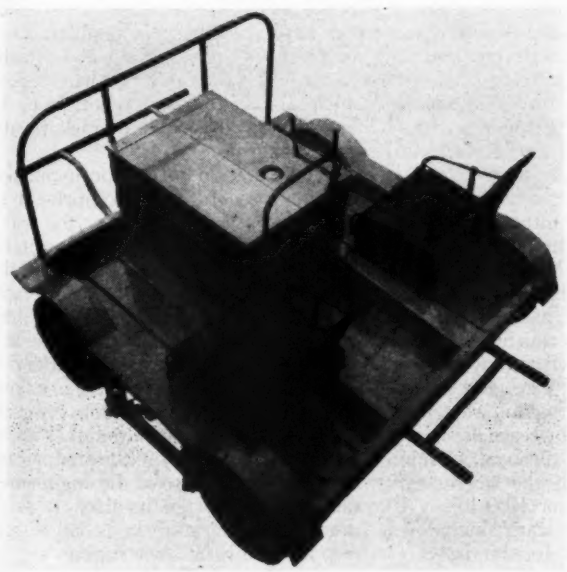
Difference Is Small

Many roads make no distinction between one-man and light inspection cars, grouping them both under the latter term. As a matter of fact, the difference is small and under some conditions, as for example, in soft ballast or over a high rail, the larger car may be handled by a strong man quite as easily as the smaller car on account of its larger wheels. The grouping of these light cars into two classes instead of one is convenient, however, for record purposes, and to avoid misunderstanding in ordering.

The earlier types of light inspection and one-man cars were side-load cars, similar in general construction to velocipede cars, with the deck or frame over two large wheels and with guide arms extending to one, and sometimes two, guide wheels on the opposite rail, the load being carried principally on the two larger wheels. The first power units used on this type of car were four-cycle engines, direct-connected to one of the main wheels, although, as the cars were developed further, two-cycle engines came into use, partly because of the reduction of weight, but chiefly for the reason that they were cheaper to build than the four-cycle engine and somewhat simpler in construction and operation. Power was transmitted to the wheels by both chain and gear drive. The majority of the engines used on this type of car were single-cylinder, although two-cylinder engines were also used to some extent.

Side-Load Car

The side-load car was very popular on account of its light weight, which ranged from 325 to 375 lb., and the ease with which it could be handled on and off the track. In fact, because the weight was largely over one rail, the car could, in emergency, be thrown from the track in a few seconds by raising the guide wheel outrigger and thus rolling the car over. However, this car was not entirely safe for it had a tendency to leave the rails on curved track, and the power, generally applied to one wheel only, was sometimes inadequate. In its original form, this type of car has largely disappeared, although a modification of it, in which the engine is mounted just inside but not over the rail, is used by some roads. This car is of essentially the same construction as the modern center-load car except for the mounting of the engine. Its claim for favor is based principally on the fact that the tool tray space is entirely on one side, permitting the carrying of more bulky materials.



Left: A Light Inspection Car with Center Deck. Above—A Light Section Car

In section service it is desirable that tool trays be 66 to 68 in. long in order that the longest lining bars and claw bars can be stowed without overhanging. For this reason, the light inspection car is not adapted for section use, even though the gang does not exceed, in number of men, the maximum seating capacity of the car. With tool trays of adequate length, the seat deck is long enough to accommodate six men comfortably. The

frame, too, must be sufficiently rugged to carry that many men and the tools used by them. A light section car that meets these requirements may often be powered by the same engine as the same manufacturer's light inspection car, except that the gear ratio is changed to give greater power at the same car speed. At a speed of 20 m.p.h., the power will ordinarily not exceed 7 hp. Such a car will generally weigh between 700 and 800 lb. The wheels are usually 16 in. in diameter, although 14-in. wheels have been used in some cases as a means of reducing weight.

Example of a Standard Section Car

Standard Section Cars

The standard section car is similar in general design to the light section car, although the seat deck is a few inches longer than on the light section car and eight men can be seated in reasonable comfort. More rugged construction is required to carry the larger load of men and their tools, and the weight of the car is, therefore, increased, ranging from 900 to 1100 lb. A larger engine is required for the heavier load, and also to provide power for towing push cars loaded with materials or trailer cars carrying men. This power unit is commonly a single-cylinder, two-cycle engine having 6 to 11 hp. at a car speed of 20 m.p.h. At present, 16-in. wheels are common on most standard section cars. Formerly, 20-in. wheels were largely used on cars of this type and many cars now in service are so equipped.

Many railroads have, in the past, made no distinction between light section and standard section cars and have used the larger car, whether the gang was large or small. This had the advantages that it simplified the distribution of section cars, for any car could be assigned to any section; it assured sufficient power for towing a push car or trailer, and it provided capacity for an occasional increase in the size of the gang. However, there are territories on which gangs seldom exceed four or five men, and for such locations the smaller car is much to be preferred, especially where the alinement of the track and the speed of trains make necessary the quick removal of the car from the track.

Some railroads use section gangs larger than can be handled comfortably by the standard section car described above. For such gangs, larger cars, often with two-cylinder, four-cycle engines of about 12 hp., have been used. Such cars, which might now be termed heavy section cars, were commonly used for bridge and building and extra gang service until within the last few years when the increasing practice of towing loaded push cars and trailers has brought about a demand for greater power.

Heavy-Duty Cars

This demand is met by the heavy-duty car. While it is much the same as the section car in general arrangement, and has not very much greater seating capacity on the car itself, it has, through its greater engine power and its ability to handle trailers, the capacity to transport gangs of 100 men or more or to tow maintenance of way machines. In such a car, a four, or sometimes six or eight, cylinder engine of the automotive type is used, and the power rating may run as high as 85 hp., although engines rated from 16 to 32 hp. are more common. The modern heavy-duty car is equipped with a selective transmission similar to that used in automobiles and trucks, permitting full use of the engine power at any desired speed. The larger size and necessarily heavier construction result, of course, in a further increase in weight. The smaller heavy-duty cars weigh about 1500 lb., while the largest cars may weigh as high as 2400 lb.

Party inspection cars include a wide range of sizes and kinds, varying from ordinary section cars to large cars with automobile bodies and engines up to 112 hp. Section and other work cars are used for division inspection service in many instances, the seating arrangement being changed to meet the requirements. In many instances, the seats are enclosed in metal or wooden housings, with doors and windows.

Automobiles have also been converted into party inspection cars by installing suitable axles and flanged wheels. In other cases, wheels with special flanges and equipped with pneumatic tires have been applied. For this service also, specially designed cars have been used with pneumatic-tired wheels for highway use and retractable flanged wheels for operating on the track.

There appears to be no unanimity of opinion among officers using party inspection cars regarding the features desired in such cars, and the requirements as to size and seating capacity vary greatly. However, the differences of opinion seem to extend beyond the questions of size and seating capacity; and in consequence, to meet specific demands, many such cars have been built in railroad shops at much higher costs than cars of like capacity could be purchased for if standard designs could be agreed upon.

Power Cars

The six general classes of cars discussed above meet today's requirements well. Mention should be made, however, of other cars that do not fall readily into any one of these six groups. These may be termed power cars and consist of a motor car on which an air compressor or electric generator is mounted and operated by the same engine that operates the car. Some such cars are in use, but the idea has never become very popular. Even in a heavy-duty car, the weight of the car is of considerable importance as it must always be light enough to be handled on and off the track by the gang using it.

The addition of a permanently-mounted generator or compressor to any motor car increases the car's weight materially, and the car itself must be made heavier to support the increased load. This added weight must always be carried when the device is functioning as a motor car and is burdensome when handling the car. Furthermore, the size of the engine required for the generator or compressor may be considerably greater than that required for the motor car; and the constant use of the engine may measurably shorten its life. A skid-mounted generator or compressor, complete with its own engine, can be

moved to the job on a push car, and, once delivered there, may remain until the job is completed, with no further handling than that incident to the progress of the work. The conditions under which the use of power cars is advantageous are comparatively unusual.

To some extent the considerations applying to the power car for operating pneumatic or electric hand tools apply also to self-propelling mechanisms on compressors, arc welding generators, and machines of similar character. In these, however, the self-propelling feature is provided as an aid in carrying out the work the machine is doing and not to replace a motor car in transporting men or materials.

Free-Running Cars

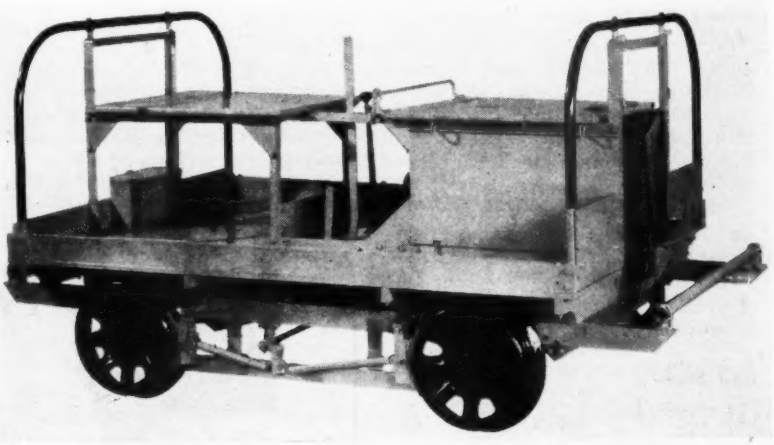
A further classification of motor cars was formerly made with respect to the manner in which the power of the engine is transmitted to the axle and wheels. Reference has been made previously to direct-connected cars, in which the power is applied to the axle without any intervening clutch or other release; in fact, in many cars of this type, the axle serves also as the crank shaft of the engine. On a direct-connected car, the engine can run only when the car is moving, and so can be started only by pushing the car along the track, after which the men pushing it must mount the car while it is in motion. This is hazardous and poorly adapted especially for handling a trailer; the design is, therefore, more objectionable in a gang car than in the smaller cars with which the towing of a trailer is rarely desirable. This construction is now considered obsolete, although some direct-connected cars are still in service.

As opposed to the direct-connected car, the modern car has a free-running engine. By this is meant that by throwing out a clutch or loosening a belt, or by other means, the power may be disconnected from the car; and the engine, therefore, may run although the car is motionless. This arrangement has many advantages: the engine may be started by cranking, and permitted to warm up before any load is applied; the men may take their places on the car before it is put in motion; and the car may be stopped at any time without shutting off the engine, and, after an interval, started again. These conditions make for safety at all times and are essential where the motor car is to be used for towing; in fact, some roads prohibit by rule, and wisely, the towing of trailers behind cars that do not have free-running engines.

Many methods are employed for transmitting the power from the free-running engine to the drive axle of the car. Some of these provide for variations in speed; others do not. Some provide also for reversing the direction of the power, while others do not. A full discussion of these methods will be included in a later article.

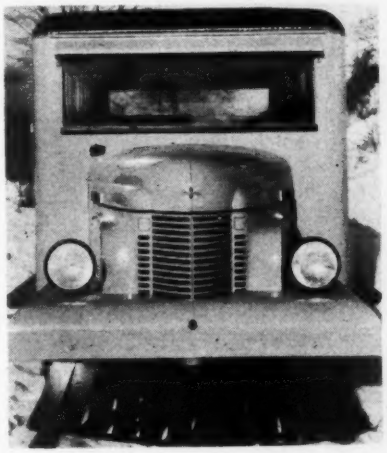
The Importance of Weight

In selecting a car for any service, it must be kept in mind that those riding on it must be able to remove it from the track; and in heavy and fast train traffic on territories where alinement does not permit a clear view for any great distance, its removal must often be done very quickly. This is true of all cars in work service, from the one-man car to the largest heavy-duty car. The latter, to be sure, may at times work under flag protection; but in general the rule holds, and ease of handling must be given full consideration.



Gang Car Designed for Heavy-Duty Service

Two things are involved in the easy handling of a car. The first of these is, of course, its weight, to which references have already been made. While weight reduction is desirable, there are limits that must be observed; the car must be strong enough for the service for which it is designed; it should also have certain safety features such as safety rails, rail skids, wheel guards, and, if a gang car, tool guards, all of which add to the weight. Although much has been accomplished in the reduction of weight, the handling of the present-day car often taxes the strength of the men using it, and not infrequently, the car cannot be removed from the track quickly enough to avoid being struck by high-speed trains.



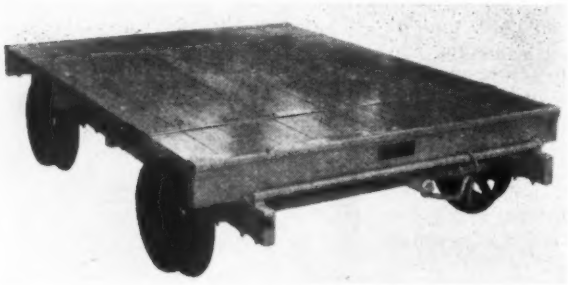
A Party Inspection Car

Weight Reduction

In design, weight reduction may be sought in different ways: the use of light-weight, high-strength materials, where applicable, is effective when such materials are available, but the proper proportioning of all parts to give adequate, but not excessive, strength should not be overlooked. Running on a relatively rigid track, the motor car is subject to much shock and vibration and each part must be of adequate strength to absorb that shock. To so design each part and still keep the weight down, calls for very careful study on the part of the designer.

But weight alone is not the only factor that contributes to ease of handling; the distribution of the weight, or what may be termed the balance, of the car, is quite as important. Bearing in mind that the comon method of handling a car on or off the track is to lift the rear, or drive-axle, end and permit the front, or loose axle, end to roll, it is apparent that the greater

part of the weight should be on the front end. The adoption of free-running engine construction made it possible to place the engine, which may represent as much as 25 per cent of the total weight of the car, over the front axle, where it will be carried by the rolling front wheels, whereas, in the direct-connected car, the engine weight is at or near the rear end and must be lifted. This change did much to improve the ease with which cars could be handled.



Left—A Modern Push Car

Total Manufacturer's Weight and Lifting Weight of Various Types of Cars

Type of Car	*Total Weight*	*Rear Lifting Weight*
One-man car	515 lb.	95 lb.
" " "	540 "	100 "
" " "	544 "	90 "
" " "	550 "	95 "
Light inspection car	575 "	95 "
" " "	595 "	110 "
" " "	630 "	110 "
Light section car	700 "	—†
" " "	700 "	102 "
" " "	765 "	140 "
" " "	780 "	105 "
Standard section car	929 "	125 "
" " "	935 "	145 "
" " "	950 "	—†
" " "	975 "	145 "
Heavy section or gang car	1100 "	#295 "
" " " " "	1150 "	#321 "
" " " " "	1225 "	#290 "
Heavy-duty car	1500 "	#330 "
" " "	1500 "	—†
" " "	1545 "	195 "
" " "	1800 "	#530 "
" " "	2000 "	225 "
" " "	2200 "	#400 "
" " "	2400 "	#610 "

Without extension lifting handles.
† Weight figures not available.

Extension Lifting Handles

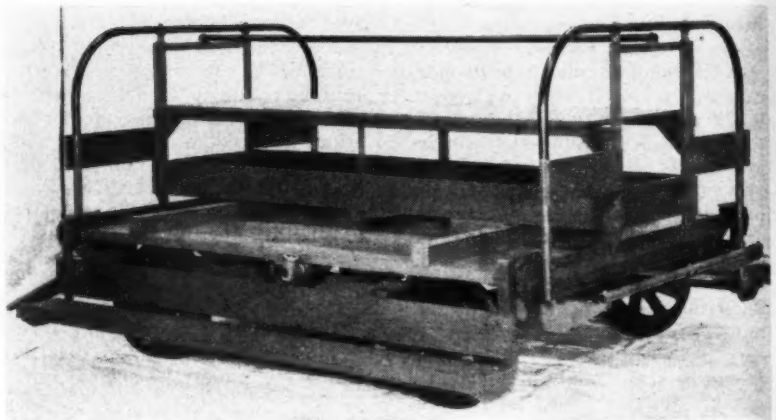
Another contribution to the ease of handling was the introduction of extension lifting handles. These are handles that project only a short distance from the end of the car when it is in use, but which are so arranged that they can be pulled out quickly 15 in. or more to give greater leverage in handling the car. On small cars, they usually may be extended to both the rear and the front, but where used on gang cars, they usually can be extended only to the rear. They are now standard equipment on practically all one-man, light inspection and light section cars, and are used on many standard section cars and a few heavy-duty cars. By the use of extension lifting handles, the rear lifting weight may often be reduced to 50 per cent or less of the total normal rear weight of the car. While of less value where the car must be removed in open track, especially where the ballast is soft, their value in handling the car at road crossings or at motor car set-offs is unquestioned.

Rail Skids

In open track, rail skids are of great help in handling the car as they prevent the wheels from dropping down between the rails when the car is crosswise of the track. They also protect the brake rigging and frame parts from damage caused by impact on the rail as the car is handled to or from the track. The more recently devised set-off skids that are now applied to many of the smaller cars also help in lifting the car over the rail when it is crosswise of the track.

In the accompanying table, the advertised weights are shown for 25 cars of various sizes. The weights apply to cars built previous to the beginning of World War II. For some time the restrictions on many critical materials have made necessary increases in weight that amount to 20 per cent or more in some of the smaller cars. The weights shown may be assumed to include safety rails and rail skids, but not the fuel required for operation, or the water for cooling if a water-cooled engine is used. In even the smallest car, the fuel and water may often increase the weight by 40 lb. or more.

It is hoped that when the present emergency has passed, the use of hitherto-unused high-strength materials and further improvements in design may reduce the weights considerably below those shown. From the standpoint of the railroads this is very desirable, as ease of handling becomes of greatly increased importance in these days of high-speed trains.



Gang Trailer Car Formed by Adding Detachable Seats and Foot Boards to a Push Car

The Complete Co-Operation of Every American Will Be Required If the National Goal of the Seventh War Loan Drive—$14,000,000,000—Is To Be Achieved

During the Last Six Months Tie Production Has Decreased Steadily

Maintenance Materials

The Situation Today*

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That material shortages are still acute is clearly evident from this review of the present situation. The decline in the production of crossties is especially serious and is likely, says Mr. Mann, to cause real difficulty in 1946 and 1947. Also discussed are bridge and building lumber, new rail, frogs and switches, signal material and roadway machines

THE purpose of this discussion is to convey some idea of the present over-all picture, as viewed nationally, regarding the availability of the more important items of materials and supplies employed in maintenance of way and structures work.

Let us glance first at the crosstie picture. It is no exaggeration to recognize crossties as the real foundation of our track structure. We cannot have railroads or perform the vital function of transportation without a constant and an adequate supply of crossties. The present acute shortage of crossties has confronted the railroads with a critical situation.

For the last five or six months the production of crossties has decreased steadily. Fortunately, the railroads have accumulated, from 1944 production, sufficient crossties to be seasoned, treated and distributed for use during 1945. The great decrease in new production, amounting to more than 40 per cent at present, makes it plain, however, that there will be a great scarcity of treated crossties for use during 1946 and 1947. The railroads are carrying a tremendous burden of traffic, and the failure to keep their tracks in sound condition through necessary tie renewals will result in slowing traffic and may, in some instances, cause other serious operating difficulties.

The reasons for the decrease in the production of crossties are not too readily apparent because most of the crossties are made by local hewers or small sawmills maintaining little more than their own cost records and having no national publicity. If these men find their operations are resulting in financial loss, they simply close up and go into some other line of work. Thus it requires considerable investigation to determine why many of our sources of materials have disappeared.

The reasons given by various producers for discontinuing the manufacture of crossties may be classified as follows:

(1) Lack of manpower.

(2) Inability to obtain new trucks and tires and repair parts for old trucks.

(3) Failure of ceiling prices of crossties to keep pace with advances in the ceiling prices of boards and other lumber.

Some Handicaps

The work of making, handling and hauling crossties is laborious. At the best there is small profit in this work. Under present conditions, only the most efficient workers can make any profit at all. When such is the case with experienced labor, the producers cannot be expected to take imported laborers and try to teach them to make crossties within their present extremely small margin of profit. The United States Employment Service is of no help in this situation, because if a worker should be referred to a tie camp he would refuse the work in view of the fact that so many better jobs are available.

Ceiling Prices

When the Maximum Price Regulations were issued in 1942, the issuance of MPR-216 established ceiling prices for crossties which, in the main, were sufficient to continue the volume of tie production prevailing at that time. Some of the railroads expressed the thought that the prices were high, but not even these increased prices brought about an increase in tie production. Then, not long after MPR-216 became effective, increases in the prices of various items of lumber were put into effect. This process has continued until the spread between tie prices and lumber board prices is so wide that sawmills formerly producing crossties now cut the entire log into boards.

With all of the assistance that it has been possible to give up to now

* Abstract of an address presented before the Maintenance of Way Club of Chicago on April 23.

in manpower, in equipment and in the ceiling prices of crossties, there appears no chance whatever of restoring the volume of crosstie production existing in 1943. Consequently, the situation is truly serious. If present conditions continue there is no apparent prospect of the railroads being able to maintain their tracks adequately in 1946 and in 1947.

This situation calls for vigorous action. The War Production Board and the Office of Defense Transportation must convince the War Manpower Commission and the Office of Price Administration of the seriousness of the crosstie situation. That situation must receive prompt and effective study and action to the end that tie makers may be induced to resume the manufacture of railroad crossties. There must be no further temporizing or delay.

For the last two years lumber has been one of the most critical items needed in carrying on the war, and in the third quarter of 1944 it was put under rigid control by the War Production Board. The heavy demand of the armed services is for 1-in. and 2-in. boards. This results definitely in a shortage of lumber for buildings and car repairs, although it does not seriously interfere with bridge and structural sizes. At least, that is our experience on the Illinois Central. There is little likelihood of any reduction in the demand for lumber by war agencies. In view of the fact that lumber mills are suffering from the same difficulty as the crosstie producers, there is reason to expect a continuing shortage in lumber for maintenance work.

New Rail

Next to crossties, our most acute material shortage is in rail. During 1944, the railroads received a little less than 75 per cent of their rail requirements for the year, due to reduced allocations by the War Production Board. The original allotment for this year indicates that the railroads will receive only about 58 per cent of what they requested. Unless there is a change for the better in the third and fourth quarters, this allotment will stand for the entire year as the experience has been that the allotments for the first and second quarters equal just about 50 per cent of the year's total.

For use with new rail, the railroads are assured by the War Production Board that track accessories of all kinds will be available as the rail itself reaches us. For maintenance work, however, there is a different story. The War Production Board has reduced the allocations for the first half of 1945 by 25 per cent under the amount which the railroads were initially allowed to order. Even so deliveries are slow, requiring that orders for many items be placed up to nine months ahead of delivery time. Fabricated track materials, such as frogs, switches, crossings, etc., require nine to twelve months for delivery, even though the War Production Board will not allow the validation of orders that far in advance.

Signal Materials

Many items which go into the manufacture of signals and allied products are in the "critical item" class. The agencies in Washington, however, have been most helpful in recognizing the importance of proper signal installations and maintenance. Therefore, this class of work has fared reasonably well—even though deliveries require four to six months after the orders are placed. Many substitutions have been necessary.

Because of the manpower shortage the need for labor-saving devices is greater today than ever, but it is still necessary to clear requests for roadway tools and machines through the War Production Board, except where the cost is less than $500. By comparison with 1943 and 1944, the suppliers are offering now somewhat better deliveries, indicating some easing of the demands by the armed services. There will, undoubtedly, be an opportunity to obtain some types of machines from surplus government sales, although my observation so far is that such surplus machines are being offered first to the dealers in such equipment.

It is certain that the railroads in the post-war period will face keener competition than ever from all forms of transportation—highways, waterways, airways, pipelines—and that there will be even keener competition among railroads themselves. There will be a demand for faster and more frequent freight service and faster and more comfortable passenger service. Maintenance of way men will be the first to feel the impact of these new demands, for track improvements to accommodate faster train service will be our No. 1 need.

War-Time Developments

During the war years research has developed many new lightweight metals, alloys and plastics. Certainly there is talent enough in the maintenance of way field to put such developments to practical use in improving the tracks and equipment. Although we have learned much about reclamation in this period of critical shortages, I feel sure that there will be continued progress even in this field.

Employee suggestion systems in industry and on some railroads are fast proving that constructive thinking will bring forth workable and profitable ideas. I believe that the track structure constitutes a fertile field for the application of this type of thinking. We are indebted to the railroad supply fraternity for much progress and improvement—and yet I have no doubt that many of the specific demands for such progress and improvement have originated with practical railroad men. New needs and new ideas will occur to us as time goes on. Let us keep up our progressive thinking. Let us prove to the shipping and traveling public that the railroad industry is a forward looking industry—that it will provide courageously and effectively whatever transportation the future may demand.

Roadbed Grouting on New York Central

(Continued from page 478)

Prior to grouting the 13 spots that have required no attention cost an average of $314.60 a month for maintenance. The maintenance expense on the other 18 spots was reduced from $872.50 a month to $73 95 a month. The cost of grouting the 31 soft spots in 1942 was $4,334.11. The total savings in maintenance for the 12 months following grouting at these 31 spots was $13,357.80.

A total of 11,882 ft. of track was grouted during 1943, at a total cost of $16,898.69. Monthly maintenance of this track was reduced from $0.194 to $0.013 per track foot, resulting in total savings of $25,885.68 in maintenance costs for a single 12 months' period. Similar data covering grouting operations on the road during 1941, 1942 and 1944 are included in th accompanying table.

F. J. Jerome, chief engineer of the New York Central System, West of Buffalo, has general supervision of all roadbed grouting. The sub-soil investigations and initial grouting in the vicinity of Monroe, Mich., were carried out under the direct supervision of F. H. Simpson, assistant chief engineer. The grouting on all of the territory West of Buffalo is being handled by Mr. Simpson with the aid of W. T. Johnson, assistant engineer, in charge of grouting, who actively directs the individual gangs in the field and who has been largely responsible for the development of the equipment and practices now in use.

What's the ANSWER?

When Cleaning Ballast

When cleaning shoulder ballast, under what conditions is it desirable also to clean the ballast in the cribs? How can this best be done?

Discard Foul Ballast

By G. S. CRITES
Division Engineer, Baltimore & Ohio, Baltimore, Md.

Ballast has four main functions to fulfill. It should transmit and spread the traffic load as uniformly as possible to the subgrade; it should hold the track securely in line; it should drain freely; and it should provide suitable material for surfacing the track. Unless the ballast is waterlogged and mushy, it will perform these functions. If the cribs become mushy, it is usually because the ballast at the ends of the ties has become fouled and is damming the water that should be draining from them. If the shoulder ballast is kept clean to a suitable depth, the ballast in the cribs generally will not need cleaning, although there are exceptions.

Ballast on bridges, in tunnels, at station platforms, through cuts on level grades, and in tracks that are at or near ground-water level, will foul and waterlog between ties. Under such conditions the cost of cleaning the ballast in the cribs should be compared with the cost of digging this ballast out, discarding it and replacing it with new material. Usually, the new ballast will be cheaper and more effective, although in some cases it may cost less to clean the ballast in the cribs.

If the cribs are to be cleaned, this can best be done by digging out one crib per panel, and then forking the ballast from the adjoining crib into the empty crib after the dirt has been shaken from it. Refuse disposal depends upon conditions at the site of the cleaning. It can usually be thrown overboard from bridges, except at underpasses, but in tunnels and at stations it should be carried away for disposition.

Shaking ballast with a fork is arduous work, especially that from the cribs. Devices have been used to push the crib ballast out onto the shoulder ahead of the ballast-cleaning machines, but none of them will work along station platforms or in most places where it is most important to have clean ballast between the rails. Under present labor conditions it is usually best to dispose of the foul ballast from the cribs and replace it with new ballast.

Must Be Resilient

By J. O. SURPRENANT
Roadmaster, Delaware & Hudson, Schenectady, N. Y.

When ballast is not resilient because drainage is interrupted, or because it has deteriorated to such an extent that the joints are pumping, the wheel loads are not distributed uniformly to the roadbed and the track quickly becomes rough. Drainage is the fundamental reason and the only economic justification for cleaning ballast. Wartime traffic density, increased wheel loads, cinders from locomotive stacks and ashpans, severe climatic conditions and a labor shortage that has led to undermaintenance, have combined to reduce the periods between which it is necessary to clean the ballast.

If the ballast is crushed stone, and mechanical equipment is employed for cleaning the shoulder, the desirability of cleaning the cribs will be predicated on the amount of track labor available for the work. It should not be overlooked that free drainage from the cribs is as necessary as it is from the shoulder ballast, for water trapped

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Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in July

1. *What are the physical requirements for ties? For their manufacture? For their inspection? Should these requirements be relaxed in a time of tie shortage? Why?*
2. *Under what conditions can one wall of a waiting or rest room be painted a color different from the others? What color distribution is required? Are there any advantages?*
3. *In view of the increasing use of tractor-drawn equipment, to what extent is one warranted in leveling the right of way to eliminate hand mowing? How much weight should be given to other factors, such as better drainage and improved appearance?*
4. *What are the advantages and disadvantages of hand-operated, air and electric hoists for the use of bridge gangs? For what classes of work is each best suited?*
5. *What is the cause of black spots on the running surface of rail near the gage edge? How do they develop? Can they be prevented? If so, how? If not, why?*
6. *How does one determine when a wooden water tank requires renewal? A steel tank? What are the indications?*
7. *In an out-of-face surfacing program, should the center stakes for tangents be set ahead of or behind the surfacing gang? Why?*
8. *Are there any advantages in using treated material for repairing buildings? Any disadvantages? Why?*

in the track is never desirable under any circumstances.

Many miles of track are so located that applications of new ballast and light surfacing are not prohibited by clearances, grades or other obstacles. A light raise will agitate and loosen the old ballast, materially increasing the drainage capacity of the ballast section. Where conditions are such that a light raise is not possible or is not desirable, the foul ballast from the cribs should be thrown on the shoulder ahead of the ballast-cleaning equipment, to obtain the full advantage of mechanical cleaning.

The ballast in the cribs should be removed to a depth of several inches below the bottoms of the ties. Sufficient clean stone should be thrown back into the cribs to keep the track safe and secure from lateral or longitudinal movement. The new ballast required to restore the section should then be dumped into the cribs from ballast cars.

Scarifiers or discers will aid drainage and provide some relief in foul slag, cinders, sand and similar ballast materials, but the most successful remedy is to install additional ballast and raise the track. Where the elevation of the track is fixed by bridges or other overhead structures, and bad spots have developed as a result of foul ballast, a labor-saving device on multiple-track lines, is to dig between the tracks with a power shovel, and on the outside of the tracks, to a depth of 30 to 50 in. below the bottom of the tie, backfilling the excavation with large-sized stone ballast. The foul ballast in that portion of the cribs outside the rails should be removed on a grade that intersects the ballast section at a point under the rail and exposes the bottom of the tie adjacent to the excavation.

Ballast may be foul where the rail is in good condition and, when no wheels are passing, the track may appear to have a good surface when, in fact, there may be pockets or voids under the rail, so that the tie does not have a uniform support, causing the track to churn. These pockets cannot be seen, for which reason they often deceive the track forces. The deflection of the tie is increased further by compression, deformation and displacement of the ballast, thus decreasing the efficiency of the track as a structure for carrying the rolling loads.

To eliminate these small pockets and to provide additional bearing surface to transfer the pressure from the wheels to the ballast, a device connected directly to the rail adjacent to the tie, designated as a stabilizer, is now under test on an eastern road. This device has a bearing plate that reaches to the bottom of the tie and, using the wave motion of the rail, it acts as a power tamper. It is claimed that it automatically increases the stability of the track by keeping the ballast packed under the ties, and thus increases the interval between successive ballast-cleaning operations.

How Much Risk in Gas Welding?

What precautions against fire should be taken when using gas-welding and cutting equipment in buildings? On bridges? How effective are they?

No Great Hazard

By Shop Supervisor

The welding torch does not present any greater hazard from fire than any other open flame, provided it is used with the care that should be exercised when it is employed. Such fires as have occurred through its use can be traced directly to carelessness or to failure to realize the necessity for taking simple precautions. While it is true that the oxy-acetylene flame develops a more intense heat than many other flames that must be used in buildings, and that there is a certain amount of hazard from flying sparks, fires can be prevented if the same good judgment and care are employed as with other open flames.

The use of blow torches for removing paint from both steel and wood structures is equally hazardous, yet the oxy-acetylene torch is often singled out as a particularly great fire hazard. In some cases, railways have been inclined to prohibit their use in coal chutes, shops, enginehouses and other buildings because of the danger of fire. The destruction of one of the world's greatest steamships, the result of gross carelessness in the use of a welding torch, has given particular importance to observing precautions against fire when welding or cutting equipment is in use.

Welding torches should never be used in close proximity to inflammable material, or in closed places where gases or dust are likely to accumulate. Good ventilation should always be provided where a torch is used. The torch should always be ignited before entering a closed place and removed whenever the work is interrupted for any reason. This is to avoid the possibility of an explosion and consequent fire from escaping acetylene gas. When welding closed vessels they should first be filled with hot water and emptied to expel any gas that may be present.

When welding or cutting metal with the torch, in or near buildings, a fire extinguisher should be within easy reach, or water in buckets should be placed where they will be available to quench an incipient fire. Shields may also be provided to prevent flying sparks from entering cracks or crevices where they may smolder and later break into flame, or where they may come into contact with inflammable material.

Precautions should be taken at the close of the working day to see that the metal heated by welding is not left close to inflammable material, and that there are no smoldering sparks that might cause a fire. Care should also be exercised in handling acetylene tanks to avoid dropping or jarring them. Hose and connections should be maintained in good condition to avoid leaks. Valves on all tanks, whether filled or empty, should be closed when not in use to prevent the escape of gas. Good judgment and the safeguards that would be followed in the use of any open flame will reduce the possibility of fire from either gas or electric welding.

Care Reduces Risk

By Supervisor of Bridges and Buildings

While the manipulation of any open flame is attended with a certain amount of fire hazard, if the use of an oxy-acetylene welding or cutting torch is surrounded with a reasonable amount of care, the risk will be reduced to the minimum, so far as the flame from the torch is concerned. If equal care is exercised to prevent sparks of molten metal from coming in contact with inflammable matter, the remainder of the risk that is inherent in an open flame will be practically eliminated. In fact, there are other fire hazards of greater magnitude, to which we have become so accustomed that we scarcely give them a thought.

To my mind, and this conclusion is based on many years of experience and observation in the use of welding equipment and the handling of the gas tanks, the thing that should cause the most anxiety is the danger of explosion where suitable care is not employed in the handling of the tanks.

Oxygen tanks are under heavy internal pressure when completely filled, for which reason they should be handled without jar. Yet, I have seen newly filled tanks dropped from a box car to a paved surface or shop floor with an extremely heavy jar. If such a tank had let go, it would have caused severe damage to the shop building or other structure in the vicinity and might have caused considerable loss of life. The employees at the plants where the tanks are filled treat them with much greater respect.

Likewise, failure to close and keep closed the outlet valves on acetylene tanks creates a high risk of both explosion and fire. A gang was loading empty acetylene tanks into a box car for return to the manufacturer, without checking the valves. When the car was about two-thirds filled, the gang stopped for lunch and, although the tanks presumably had been empty for some time, enough gas to form an explosive mixture accumulated in the car, despite the fact that the door on one side remained open. This mixture was touched off when one of the men entered with a lighted cigarette. The car was blown to bits and four men were killed.

Single or Double-Acting Jacks

What are the relative merits of single- and double-acting track jacks for general surfacing? For section work? Why?

Requires Less Effort

By C. R. Schoenfield
Roadmaster, Chicago, Burlington & Quincy, Aurora, Ill.

My choice of a jack is the single-acting type for all-around work by both section and extra gangs. I am sure that most trackmen, foremen and supervisors will agree that it requires less effort to operate the jack handle and that this jack has less tendency to throw the track out of line as it is being lifted.

Single-Acting Jack Better

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

I have found sharp differences of opinion among experienced trackmen with respect to the relative merits of single- and double-acting track jacks, for both general surfacing and section use. It is my observation, however, that for general purposes the single-acting jack is superior to the double-acting type. There is no reason, so far as I have ever observed, why the track should be thrown out of line while it is being raised with a single-acting jack, provided the jack is set correctly under the rail, so that the lift will be vertical.

With the single-acting jack the track is lifted as the jack handle or lever arm is making a downward stroke, and there is no load on the lever arm as it is returned to its upper positions. In applying this pressure, the jack operator is able to exert a steady force, partly by using his own weight, without jerking or displacing the jack in any way. On the contrary, when using a double-acting jack, force must be applied to the jack handle during both the upward and downward strokes. Obviously, the downward stroke of the jack handle can be made in the same way as that for the single-acting type. Instead of the application of pressure, including the use of part of the operator's weight, the upward stroke requires a lift and a purely muscular effort.

Even though the double-acting jack is placed in a vertical position, the same as the single-acting jack should be, when the upward stroke is made, there is a marked tendency on the part of the operator to jerk the handle as he makes the pull, particularly if the jack is loaded heavily, and, unless he is watched, he is quite likely to shift the jack from its vertical position to a leaning position, which cannot avoid affecting the line as the track is raised.

Obviously, a man can apply his weight to the jack handle more steadily than he can make a pull, especially if it becomes necessary to exert considerable muscular effort to overcome the resistance that results from a heavy load. This tendency to lurch in making the pull increases as the jack handle approaches the limit of its upward motion and is at the maximum just before it is high enough to engage the dog and "notch the jack."

It may be of interest to some of the younger trackmen to know that when I first began to work on the railway, track was raised by inserting a locust pole, known as a lifting bar, under the end of a tie and prying up on it. To hold the tie to the desired elevation, it was not uncommon for the poleman to sit on the bar until the tie was spiked or tamped, so that it would not dip or change its elevation when the pole was removed. It was considered quite a joke for the tampers or spikers to catch the poleman unawares and to strike the tie in such a way as to shift the pole on the fulcrum and throw him to the ground.

Favors Single-Acting Jack

By Edward Burke
Assistant Track Supervisor, Central of New Jersey, Jersey City, N. J.

With the single-acting track jack, the load is raised simultaneously with the downward stroke of the jack handle or operating lever. On the up stroke there is no load on the operating lever, so that it comes up free and requires no effort on the part of the operator. The operator must apply force on the down stroke, but no force, other than that necessary to overcome the weight of the lever, is required on the up stroke.

With the double-acting track jack, the load is raised on both the upward and downward strokes of the operating lever. For this reason, the operator of this type of jack has to use force to pull the operating lever up. On the down stroke of the operating lever, the operator lifts the load by bringing his body weight into play. On the other hand, in making the upward stroke of the operating lever, the operator actually has to lift the load (the actual lift on the lever being modified by the ratio of the lever arm to the fulcrum arm), which often requires considerable force.

Obviously, the double-acting track jack is faster in its operation than the single-acting jack. This time factor in lifting a load is so small, however, that for all practical purposes it becomes negligible.

If we use the double-acting track jack for either section work or general surfacing, we have the hazard that when pulling up on the operating lever the operator may find it necessary to exert an excessive muscular effort, and in this way may acquire a strained back. A strained back, however, inconsequential as it may seem to be at first, may develop into an aggravated injury, resulting in lost time for the man and considerable expense to the company.

It is my conclusion that the double-acting track jack, because it places a strain on the operator during the period of the upward stroke of the operating lever, presents a safety hazard to the person or persons operating it, which has cost the railways

many days in lost time and personal-injury payments. Summing up all of these features of the two types of jacks, I am forced to conclude that there is no justification for the use of the double-acting track jack in track work, and that the single-acting type of jack should always be used.

Spot Tampers on Sections

Where section gangs are equipped with spot tampers, how should a gang be organized if tie renewals are made in connection with the spot surfacing? What are the advantages?

Cannot Be Standardized

By Division Engineer

Consideration of how a gang should be organized can be discussed in general terms for almost any kind of work, but just how the men should be assigned is a matter that cannot be standardized or stated categorically, for even when a section gang is engaged in the routine job of surfacing and renewing ties, the condition surrounding the work will vary from time to time to an extent that may require a wide departure in the assignments as they were made originally. In other words, for best results, the gang organization should be flexible enough to meet every contingency.

Not only will the assignments vary with the number of men in the gangs, but with the number of ties to be renewed, the amount of surfacing that is required and the number of tamping units available, as well as with the density of traffic, which must also be taken into account. However, assuming a gang consisting of a foreman and five men, it is possible to outline a typical organization for this work. I would assign two men to renewing ties, to gaging and to operating the jack. They should also change off with the men handling the tampers at suitable intervals. Two men should be assigned to the tampers and the fifth man should do roustabout work, that is, he should reset anti-creepers, drive down spikes and dress ballast. If he falls behind on the latter job, as he probably will, the whole gang should be assigned to the dressing for a short period before quitting time, so that no undressed track will be left over night.

Depends on Many Variables

By Roadmaster

In general, the organization of a section gang to enable it to use the tamping equipment to the best advantage will depend in large measure on the size of the gang, the number of ties to be renewed per mile of track, and in some cases on the number of tamping units assigned to the gang. If the number of ties to be renewed is less than 100 to the mile, they will have minimum effect on a small gang, say of four men equipped with only two tamping units, for only a few ties, depending on the amount of tamping that is required, will be renewed in any day. If, on the other hand, two or three ties per panel must be replaced, they will have maximum effect on such a gang.

In the first case, arrangements should be made for alternating the handling of the tampers with other work so that none of the men will become over-tired. If this is done the few ties that must be replaced can be inserted by the men who happen to be on relief from the operation of the tampers, in the same way that they are called on to gage the track, drive down spikes, handle the jacks and do other work incidental to the main operation of smoothing the track. In this way the surfacing will scarcely be affected.

In the event that a large number of ties must be replaced, this may become the primary work of the gang and more men will be needed. They should, therefore, be organized primarily for renewing the ties, with the surfacing as the secondary or incidental operation. The actual assignments of the men will vary with the number in the gang and with the progress of the incidental work, such as gaging, spiking, dressing the ballast and the other tasks that must be done in connection with the main operation.

Eliminating Slow Orders

To what extent and in what ways can slow orders be eliminated or the maximum speed under such orders be increased when making repairs to open-deck trestles? To steel spans?

Speed Here to Stay

By General Inspector of Bridges

Increased train speeds were a peace-time development that has continued near the former maximum during the period of the war, and which in all probability will be developed still further in the post-war period. Indeed, if the average speed of freight trains was now no higher than that which was attained during the first world war, it is a certainty that the greater traffic of today could not be moved with the expedition and dependability that is needed to support our fighting forces. Because of the importance of this traffic, it is little short of criminal to interrupt or delay the movement of a train, if this can be avoided with safety. Furthermore, I foresee that this policy will be a prominent feature of railway operation in the post-war period when competition will demand the same expeditious movement of peace-time commodities.

For these reasons, the forces engaged in bridge maintenance should understand that the time is past when slow orders can be applied freely and with little questioning, and prepare themselves for the new era in which they must fully justify any such orders they may desire to apply. Again, the repair work must be done in a manner that will permit higher speeds where restrictions must be applied, for it is recognized that bridge repairs cannot be made, in all instances, without placing some restrictions on train movements. However, it is essential that there be careful planning and close supervision on the part of both the supervisor and the foreman, together with a determination to revise long-standing practices that were developed under less rigorous speed requirements. This will also tend to shorten the period that these restrictions must be in effect.

Obviously, trestles must be better braced and stiffer, and bolts must be kept tight more consistently than has been the practice in the past. Ties must be kept spaced and to a solid bearing on the stringers so that the rail will have a solid uniform support. Whatever work is required on the structure must be done in such a way that the track will not be thrown out of line, for this will not only make the track over the bridge ride rough, but it may create stresses that will not

be good for the structure. In other words, the work should be planned and carried out in such a way that the structure will not only always be safe for the passage of trains at the speed specified, but so that the track will ride so smoothly that passengers will not be aware that work is being done on the structure.

Obviously, work that is being done under such rigorous requirements will cost more than work that was done in accordance with practices that required rather severe speed restrictions. Furthermore, the foreman and the men engaged on the work must be more alert, with quick reactions to any situation that may arise unexpectedly. This will require that younger men who are quicker in their movements be assigned to gangs that are engaged in the maintenance of the structure. It should be understood, however, that men without sufficient experience may be as undesirable on such a job as men who are not agile or mentally alert.

they have not already done so, in such a way that for ordinary maintenance work it will not be necessary to place slow orders over the structures upon which they are working; and that where the nature of the work makes speed restrictions necessary, the allowable speed be far higher than in the past. Where slow orders must be placed, special effort must be made to shorten the effective period as much as possible.

How can this be accomplished? In the first place, it should be understood that the higher speeds that must be provided for do not require any fundamental changes in the methods now employed in the maintenance of bridges, or in the organization of the gangs engaged in this work. They do, however, require the exercise of more care in both the planning and execution of the work and the application of system in the handling of material with respect to where it is unloaded on the job and the sequence in which it will be used. For instance, if the work involves the renewal of the ties on the structure, they should be unloaded as close to the bridge as practicable and arranged in exactly the same order as they will be called for as the renewals progress. In addition, each tie should be marked with its serial number so that there will be no error or confusion in making the insertion in the correct order.

While an open-deck trestle of either the pile or framed-bent type can frequently be renewed in its entirety, or the deck of an open-deck steel span, without applying a slow order, this is scarcely possible in the case of a ballast-deck trestle, owing to the necessity for carrying the track on blocking that must be shifted at short intervals as the caps, the stringers and the floor boards are removed and replaced. However, with care, the period during which the slow order is required can be shortened materially eliminating many train delays.

Speeds May Be Higher

By Supervisor of Bridges and Buildings

High-speed light-weight passenger trains were introduced about ten years ago on several western roads in an effort to recapture some of the passenger business that had been lost to other forms of transportation. The idea appealed to both the public and to other roads, with the result that within a short time numerous roads began to operate light-weight passenger trains on shortened schedules. However, there was a surprising reaction on the part of the public, which demanded faster service on established passenger trains, so that there was a tightening of passenger schedules all along the line, even on roads that were not competitors of those that were operating the fast, light-weight trains.

A still more surprising reaction was a demand for faster freight service and earlier deliveries of freight at distant points. The overall result of these demands was that all trains were soon moving at far higher average speeds than were believed to be practicable, or that were even considered before the light-weight trains were placed in service. With the advent of the war the continuance of these shortened schedules became a prime necessity, and there seems to be no question but that they will be continued or further shortened in the post-war period.

This being so, it becomes essential that the forces engaged in bridge maintenance revise their practices, if

Starting a Pump Under Water

What procedure should be followed in starting a reciprocating steam pump that is submerged? Why?

Keeps the Pump Hot

By E. M. Grime
Engineer of Water Service, Northern Pacific, St. Paul, Minn.

Open the steam valve very slowly, so that any accumulated condensate in the pump cylinders will be passed out through the exhaust slowly and no damage will be done to the cylinder. Then increase the steam supply gradually and, finally, operate the pump as fast as practicable. This may keep the pump so hot that there will be the minimum accumulation of condensate and provide the best operation under the circumstances.

Not An Uncommon Situation

By Supervisor of Water Service

The submergence of reciprocating steam pumps is not at all uncommon, particularly during floods, on streams subject to rapid rise and fall, at points where the pumps are not placed in waterproof pits, or where they are being used in temporary service.

The difficulties encountered in starting steam pumps under water depend upon a number of factors, including the depth of submergence, the pumping head and the temperature of the water. If there are only a few feet of water over the pump, and it is operating against a relatively low head, the water of condensation in the cylinders can be blown out by increasing the steam pressure and operating the pump carefully until this water is discharged.

If compressed air is available, the condensate can be blown from the cylinders by means of the air. One advantage of using the compressed air is that it does not form any additional condensate that must be taken care of along with that already in the cylinder. If the air pressure is sufficiently high, as it may be in numerout instances, the air can be utilized instead of steam to operate the pump during its period of submergence.

In any event, care should be exercised to avoid blowing gaskets, breaking cylinder heads, or damaging the pump in other ways through water hammer in the cylinders and steam chests. If possible, the cylinder cocks should be opened and allowed to remain open, to release water of condensation from the cylinders through the cocks, instead of forcing it through the exhaust ports; if possible, the discharge head should be reduced until the pump has been started.

The principal difficulty encountered in starting a submerged pump that is working against a high head of water is that the steam tends to con-

dense rapidly, particularly where the water is very cold. To reduce the rate of condensation until the pump is in full operation, the steam end of the pump should be filled with oil through the steam line, applying the oil until the steam line, the steam cylinders and the exhaust pipe are filled completely. Steam does not condense readily in the presence of oil, and this scheme has often proved successful when all others have failed because of the high rate of condensation.

Condensation of the steam will occur much more rapidly when a pump is being operated under water, so that it will be necessary to carry a higher steam pressure than when the pump is being operated under normal conditions. Again, since the increased condensation will wash away the lubricant used in the cylinders, much more oil will be required to lubricate the pump when it is submerged than is normally needed.

It is worthy of emphasis that compressed air is adapted admirably for the operation of submerged reciprocating steam pumps. While it is much more expensive than steam under normal operating conditions, it may prove to be quite economical for the operation of submerged pumps, where an ample supply at the required pressure is available. At the same time it is likely to produce more satisfactory results than steam, particularly if the water is extremely cold.

Curbs for Station Platforms

What are the advantages and disadvantages of precast and cast-in-place concrete curbs for station platforms? What conditions affect their use?

Better to Cast in Place

By General Inspector of Buildings

I have used both cast-in-place and the precast types of curbs for station platforms, as well as cribbed second-hand creosoted bridge stringers. For unimportant stations on branch lines of light traffic, for which cinder or screenings platforms are suitable, the timber curb is satisfactory, but for platforms on main lines, including those of cinders and screenings, I prefer the concrete curb. In fact, if I had the say, I would not place cinder or screenings platforms on main lines.

The precast concrete curb is a carry-over from, or a successor to, the old sandstone curbs that were installed so widely 40 to 50 years ago, of which a few still remain, in connection with old brick platforms. These curbs were about 4 in. thick, and required frequent attention to keep them in alinement because of their tendency to tip. When we first began to use concrete curbs, we retained the idea of the separate units and precast them. To overcome the tendency to tip, we widened the base to give more bearing area and while this was of some benefit, the units still displayed a tendency to get out of alinement. We then tried the cast-in-place type and found it more satisfactory in that we rarely have any tipping curbs now.

For all but minor stations where the revenue does not warrant the expenditure, we are now installing concrete platforms as the old platforms need renewal. Obviously, the cast-in-place type of curb is much more suitable for this form of construction than the precast type, besides which, it requires no expenditure for maintenance.

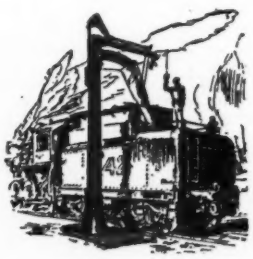
Has Full Salvage Value

By V. E. Engman

Chief Carpenter, Chicago, Milwaukee, St. Paul & Pacific, Savanna, Ill.

This road has used precast concrete curbs for station platforms for the last 30 years and, with only a few exceptions, this type of curb has given good service. Its advantages are many, including least interference with traffic during installation; individual sections can be replaced when broken or damaged, without disturbing the remainder of the platform; they can be raised readily when the grade of the track is changed; and they can be salvaged and used elsewhere if the platform is abandoned. The only disadvantage is that the use of salt to clear the platform of ice or snow has some detrimental effects on the concrete, but this applies equally to the cast-in-place type curb.

The only advantage of a cast-in-place concrete curb is that a neater appearing curb can be installed. The disadvantages are the difficulty of curing the concrete so near the track, especially where trains pass at high speed. There is also considerable interference with the use of the platform during construction of the curb and it cannot be raised readily in case the track is given a raise.



Prefers Precast Curbs

By H. M. Tremaine

District Engineer, Northern Pacific, Spokane, Wash.

It is advantageous to use the precast concrete curbs for station platforms, where such platforms are of a type to demand curbs, first, because they may be precast by forces at headquarters, or they may be purchased from commercial producers during periods of slack work. Where either of these ways of producing the curbs is employed, the concrete is given an opportunity to become well and thoroughly cured before it is set in place in the platform.

Casting concrete curbs in place is an objectionable practice because of the vibration set up in the green concrete by passing trains. Again, if the curbs are cast in place, so long a time must be allowed for curing it that the platforms must be left open for an objectionable length of time. It is difficult to find any adequate argument in favor of the cast-in-place type of concrete curb.

Both Have Advantages

By Frank H. Soothill

Chief Estimator, Illinois Central, Chicago

On heavy-traffic lines or lines upon which high-speed trains are operated, there is a distinct advantage in using precast curbing for station platforms, because the separate units can be made and cured away from the construction area and can then be set between trains, so that traffic does not interfere with the work or the placing of the precast units with the movement of trains.

Furthermore, when used with brick platforms it is easy to adjust either the curbs or the platforms, or both, at any time. This feature is of particular advantage when an attempt is made to surface adjacent track with the view of maintaining the correct relation between the top of the platform and the top of the rail. In addition, in case the platform is retired,

full salvage is generally obtainable.

Among the disadvantages of precast curbs, the most serious is a tendency to overturn and to get out of alinement, particularly as a result of frost action. This sometimes occurs also when adjacent tracks are being surfaced. Poor alinement detracts considerably from the appearance of the platform and decreases the clearance.

A cast-in-place curb provides a more stable structure than the precast type, particularly where it is used in conjunction with a concrete platform and is anchored back into the platform slab. The initial cost of this curb and its later maintenance are both lower than for the precast curb. On the other hand, it requires a longer time for construction, that is, for placing the forms, for casting the concrete, for curing and, finally, for removal of the forms. During this period the platform will require temporary walkways to make it possible for trains to receive and discharge passengers. A disadvantage of this type of curb is that it is not adapted for adjustment, once it has been installed, while little salvage can be recovered if the platform is discontinued.

Salvage of Usable Material

What methods should be followed to educate the maintenance forces to salvage usable material? Who should do this?

Foreman Should Know

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Only two persons should be held responsible for separating usable track materials from scrap, these being the foreman and the supervisor. It should be understood that this responsibility is not joint but is individual. The foreman should be responsible directly for making the segregation and the supervisor should be responsible for educating him to do this and also for the supervision necessary to make certain that the good material is recovered and that the non-usable material has been separated from it.

The foreman should know whether every item of released material can be used and where, and the supervisor should know that he has this knowledge. If he does not possess it, it is the supervisor's job to educate him to know. He should never criticize a foreman who has too much released material on hand, but should encourage him to save, and in a business-like way have him ship any surplus material to the stores department.

Requires Supervision

By C. A. Halverson
Division Roadmaster, Great Northern, Willmar, Minn.

Responsibility for educating the maintenance forces to salvage usable material should rest with the roadmaster or track supervisor who has charge of track maintenance and has, or should have, almost daily contact with the forces under his supervision. The need for salvaging usable material is especially urgent at this time because of the demand for steel for war purposes, so that the necessity for employing educational methods is increased comparably.

In general, the methods to be employed in this educational effort should be mainly in the form of supervisory direction, and should include explaining to the men the urgent needs that exist for all products of iron and particularly of steel, thus lessening the amount available for maintenance.

Wherever rail is to be laid, a careful check should be made and a statement drawn up which will show the amount of usable material that can be recovered, as well as the amount that will be classified as scrap. Plans should be made for returning the usable material to service by applying it on secondary main tracks or on branch lines. In many cases this action will avoid the necessity for purchasing new material.

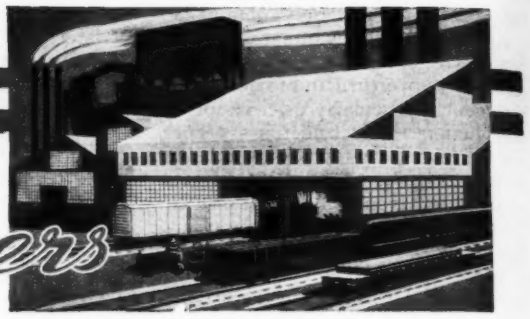
All usable bolts that are removed in the process of replacing the rail should be saved for later use, generally in the maintenanec of yard tracks, sidings and industry tracks. Likewise, spikes should be sorted carefully and those that are usable should be placed in kegs or boxes, and used preferably in the same manner as the bolts, although spikes suitable for reuse in main tracks will frequently be found in considerable quantity. Rail joints should be checked for defects and anti-creepers that do not grip the rail satisfactorily should be put aside for possible reconditioning.

Switch ties removed from under frogs and switch points on heavy-traffic lines because of wear can often be cut off and used as ties on secondary main tracks or sidings. Some of the pile stubs that can be recovered from trestles that are replaced can be split and used for fence posts. When pole lines are being replaced, old poles cut off at the ground level can also be made into fence posts or into permanent snow-fence posts with relatively small expense.

Salvagable material should be segregated from that which is plainly scrap, and the most suitable place to do this is in the field. Here it can be done at considerable less expense than at the storehouse to which most of this material is shipped. The salvaging of material by the maintenance forces should, therefore, logically, be under the direct supervision of the roadmaster or supervisor.

Damaged Railway Bridge Across the Meuse River at Vise, Belgium

PRODUCTS of Manufacturers



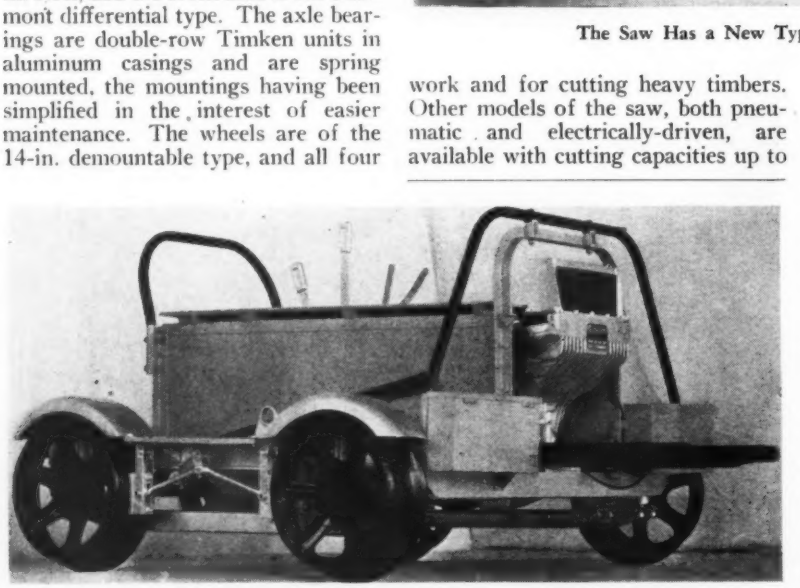
One-Man Motor Car

FAIRMONT Railway Motors, Inc., Fairmont, Minn., is now producing a new one-man inspection car, known as the Model M9 Series F car, which is said to combine light weight with ample power. The frame and housing members of the car are of heat-treated aluminum alloy, the side panels of the housing are of plywood, and the floors of the tool trays are of steel-faced plywood. The seat, which is removable, is of specially-bonded plywood, in one piece, and is held in place by quick-acting fasteners. It is 41½ in. long and is said to accommodate two men easily.

Power is supplied by a Fairmont 5-8 hp. roller-bearing, water-cooled engine embodying an aluminum water jacket, condenser cooling, an aluminum carburetor and a Hy-Duty timer. A fuel strainer, flexible fuel line and an air cleaner are standard equipment. The drive mechanism includes an endless steel cable belt with a Timken bearing idler control.

Both axles of the car are of 1 3/16-in. steel, and the front axle is the Fairmont differential type. The axle bearings are double-row Timken units in aluminum casings and are spring mounted, the mountings having been simplified in the interest of easier maintenance. The wheels are of the 14-in. demountable type, and all four of them are insulated. The four-wheel brakes are adjustable and the brake shoes are equipped with replaceable metal liners. The step plates and wheel guards are of pressed steel.

To facilitate the handling of the car, it is equipped with reinforced lift handles of the adjustable type, which may be located in one of two positions (either high or low) depending on service conditions. The lift handles are equipped with a positive safety stop.

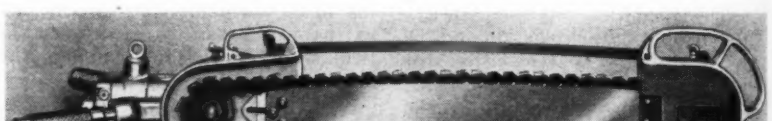


The New Fairmont M9 Series F Inspection Car

New Chain Saw

THE Lombard Governor Corporation, Ashland, Mass., has added a new 24-in. air-operated model to its line of chain saws for bridge construction work and for cutting heavy timbers. Other models of the saw, both pneumatic and electrically-driven, are available with cutting capacities up to 36 in. The new model weighs 42 lb. and is operated by a 3½-hp. air motor using 90 cu. ft. of air per min. at 90-lb. pressure.

The various saw models of the company have a new type of interlocking chain composed of links with a welded, hook form of construction which can be assembled or disassembled in five minutes, simply by hooking or unhooking. It is said that a narrower kerf, with a sequence of only four teeth, gives faster cutting action, uses less power, and yet offers greater strength. Other features of these saws are, "one-shot" lubrication, which is said to assure maximum service and long life, and a safety guard throughout their full length on top, providing protection when the saws are in action.

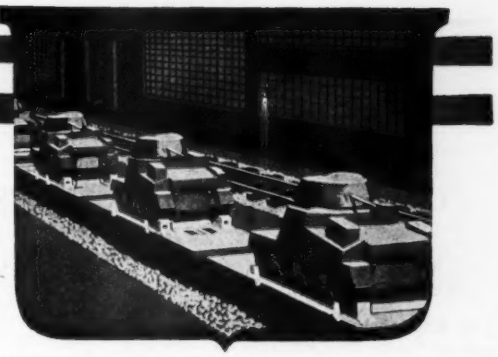


The Saw Has a New Type of Chain Construction

The saw is designed for operation by two men, but the "helpers-end" can be easily removed to permit its ready withdrawal if it becomes pinched, or to permit its use by a single operator for either backing or filling. When used as a one-man saw, the weight is supported by a strap extending from the operator's belt to a ring in the saw. In this manner, the saw is said to be surprisingly light and easy to handle.

MEXICAN QUOTAS RAISED—The War Manpower Commission has announced that the total number of Mexican laborers permitted to enter this country for railroad work has been increased from 50,000 to 75,000. As of April 14, there were a total of 52,000 Mexican Nationals employed on U. S. railroads, the large majority in maintenance of way work.

NEWS of the Month



W.M.C. Encourages Tie Production

In an effort to increase the production of crossties now badly needed by the railroads, the War Manpower Commission has classified the production of crossties, including cutting and handling to the concentration points, as a "critical activity" under the designation "timber tracts, logging camps and sawmills" in the W.M.C. list. Also, the treatment of crossties with preservatives is included as an "essential activity" under the designation "wood preservation activities" on the W.M.C. list.

According to an Office of Defense Transportation release issued recently and cleared through the Office of War Information, Col. J. Monroe Johnson, O.D.T. director, has said that this effort to keep workers employed in the various branches of the tie-producing industry is only the first step in an O.D.T. program designed to stimulate the production of railroad crossties.

O.P.A. Takes Steps To Increase Tie Production

Restoration of purchasing commissions for part-time agents of railroad tie contractors was authorized effective April 16 by the Office of Price Administration in an amendment to the eastern railroad tie regulation. Formerly these part-time agents, who acted as intermediaries between small local tie producers and tie contractors, contributed considerably to the supply by buying small quantities of ties and assembling them at railroad loading points, the O.P.A. said. Because of the small size of the individual transactions, this function has been too costly to be handled directly by a contractor, and it is expected that the partial lifting of the ban on commissions will enable these men to resume their functions, resulting in an increased supply of railroad ties.

Capital Expenditures in 1944 Highest Since 1930

Capital expenditures for equipment and other improvements to railway property made by Class I railroads in 1944 totaled $560,112,000, the greatest for any year since 1930, according to the Association of American Railroads. The 1944 total was an increase of $105,830,000 above that of 1943. Of the total, capital expenditures for roadway and structures were $231,881,000, an increase of $33,580,000 above the preceding year.

Of the $231,881,000 spent for roadway and structures, about $100,000,000 was used for improvement of tracks and sidings. For additional track, capital expenditures in 1944 totaled $20,616,000; for yards and sidings, $36,666,000; for heavier rail, $35,720,000; and for additional ballast, $6,997,000.

Man-Power Needs at 91,000

Unfilled orders for 91,727 railroad employees as of February 28, were reported by the Railroad Retirement Board. These orders included 1,331 bridge and building carpenter helpers, 502 bridge and building laborers, 11,639 extra gang trackmen and 18,740 section men.

R.R. Traffic to Continue At High Level, Says Byrnes

In his second quarterly report to Congress and the President, issued on the eve of the announcement of his resignation from the post of director of war mobilization and reconversion, Justice James F. Byrnes expressed the view that the volume of traffic in this country will decrease only slightly from its current record high levels when Germany is defeated.

While the movement of war products will decline, he said, there will be an increase in the movement of civilian products. Moreover, the shipment of guns, tanks and other heavy military supplies to the West coast will increase, and this will result in longer hauls and longer time for turn-arounds.

Rhine Span Built By Engineers in Ten Days

According to a cable to the "New York Times", the first Allied railroad bridge to span the Rhine was completed at Wesel, Germany, April 8, following months of preparation by the Corps of Engineers. Although work on the bridge proper was not begun until 6 p.m., March 29, plans had been initiated long before, with timbers and piling being removed from the Huertgen Forest, once a bloody battleground, and with meter beams (39-inch I-Beams) being rolled and track sections assembled at Differdange, in Luxembourg. Ballast for surfacing came from debris and rubble in Wesel.

Under Col. James B. Press, commanding officer of the 1056th Port Construction and Repair Group, 3,000 engineers and 500 civilians are reported to have worked even at night, aided by floodlights, and the last beam was fitted into place just two hours short of 10 days after the first piles had been driven.

The new bridge consists of 22 spans 75 ft. long and a 92-ft. navigation span, and weighs 2,140 tons. It is supported by 622 piles and can handle the heaviest of locomotives in that area. Although single-track, the railway on either side of the structure is double-track. Construction of the span involved some risk, as the current at that point was 8 m.p.h. Only three nights before completion of the job, three members of the 335th Engineers were drowned when the "duck" in which they were making an inspection overturned.

U.S. Engineers Defeat Weather

Despite freezing weather, the U. S. Army Engineers during the recent drive on the Rhine completed a concrete and steel railway bridge across the Moselle river in 16 days, a feat which French engineers had estimated would require six months to build. Working at top speed, the U. S. Engineers first made a ford to the pier sites. Then, in order to mix concrete in freezing weather, they built large fires on which sand and gravel were piled, warming them sufficiently to permit their use in concrete for the piers. To keep the concrete from freezing while it set, improvised coal stoves, made of empty cans with holes punched in them and filled with hot coals, were stacked around the piers, tents being erected over each unit to confine the heat.

I.C.C. Rules Post Driving Not a Maintenance Expense

Reporting in the No. 29140 proceeding which it describes as one involving "the fundamental distinction in accounting between capital expenditures and operating costs," the Interstate Commerce Commission, Division 1, has ruled that the cost of driving posts into the roadbed at the ends of ties to arrest water pockets and mud heaves is a capital investment, chargeable to road account No. 3, Grading. Only the cost of removing the ballast and resurfacing is found chargeable to operating expenses.

The proceeding, an investigation on the commission's own motion, was instituted May 19, 1944, after the Texas & Pacific, the Texas & New Orleans, and the Louisiana & Arkansas had disputed contentions of I.C.C. bureaus of accounts and valuation that the expenditures involved should be charged to investment. The railroads contended that the charges should be to operating expenses, and Commissioner Porter agreed.

Changes in Railway Personnel

General

P. L. Koehler, trainmaster on the Chesapeake & Ohio at St. Albans, W. Va., and an engineer by training and experience, has been promoted to assistant superintendent at Peach Creek, W. Va.

S. L. Mapes, engineer maintenance of way of the Central Railroad of New Jersey, has been promoted to assistant general manager, with headquarters as before at Jersey City, N. J.

Severn T. W. Green, superintendent of the Lehigh & New England, at Bethlehem, Pa., and formerly valuation engineer and real estate agent of that road, has been promoted to general superintendent, with the same headquarters.

Charles H. Mottier, whose election to vice-president and chief engineer of the Illinois Central, with headquarters at Chicago, was reported in the April issue, was born at Gibson City, Ill., on April 21, 1888, and was graduated in civil engineering from the University of Illinois in 1910. He entered railway service in 1910 as an instrumentman and inspector on track elevation work for the Chicago, Burlington & Quincy in Chicago, and in

Charles H. Mottier

February, 1911, went with the Illinois Central on construction work in the bridge department, serving successively as masonry inspector, construction foreman, draftsman, designer and assistant engineer. In 1918 he was transferred to the office of the chief engineer at Chicago as an assistant engineer, later being promoted to office engineer. In 1920 Mr. Mottier was appointed office engineer of the Chicago terminal improvements of the Illinois Central, and in 1924 he was appointed engineer of design, with headquarters as before at Chicago. In 1935 he was promoted to assistant to the vice-president and chief engineer, and in July, 1941, he was advanced to the position of chief engineer.

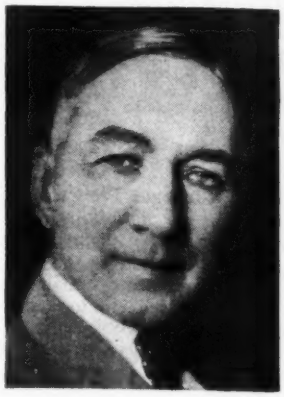
Everette A. Craft, vice-president of the Southern Pacific Lines in Texas and Louisiana, at Houston, Tex., has been advanced to executive vice-president, with the same headquarters, succeeding **H. M. Lull,** who has retired.

Mr. Craft was born at Danville, Ill., on September 11, 1893, and entered railway service in October, 1909, as a chainman on the Chicago & Eastern Illinois. He was later promoted to transitman, and, in 1914, he was advanced to assistant division engineer of the Evansville division, later being transferred successively to the Illinois and the Chicago divisions. In June, 1917, he was commissioned first lieutenant in the Engineers' Officers Reserve Corps, assigned with the 17th Engineers (Railway) at St. Nazaire, France. Mr. Craft was transferred to the Transportation Corps on November 1, 1917, and

Everette A. Craft

from January 1, 1918 to August, 1919, was a superintendent in the army transport service, receiving a commission as captain in October, 1918, and as major in February, 1919. He returned to the C. & E.I. as assistant engineer at Danville in October, 1919. In December of that year he went with the Southern Pacific Lines in Texas and Louisiana, as division engineer of the El Paso division, with headquarters at El Paso, Tex., and four months later he was appointed assistant to the engineer maintenance of way, with headquarters at Houston. In September, 1920, he was appointed assistant to the chief engineer. Mr. Craft was advanced to engineer maintenance of way in October, 1926; on March 16, 1939, he was promoted to assistant to the executive vice-president at Houston; and in December, 1943, he was elected to the position he held at the time of his new appointment.

Mr. Lull was born on March 31, 1875, at Windsor, Vt. He was graduated from Dartmouth College, Hanover, N. H., in 1897 and was engaged for a number of years as head of the department of mathematics in the Honolulu High School, entering railway service in May, 1906, as a draftsman in the district engineer's office of the Southern Pacific at San Francisco, Cal. From 1907 until 1915 he served at various points on the lines in California and Oregon as assistant engineer on the Western division, draftsman and computer in the construction department, assistant engineer on the construction of suburban electric lines at Oakland, Cal., and Berkeley, and assistant engineer in the district engineer's office at Portland, Ore. In 1915 he was promoted to assistant division engineer



H. M. Lull

on the Portland division, with headquarters at Portland, and three years later he was made division engineer on the same division with the same headquarters. In September, 1920, Mr. Lull was promoted to chief engineer of the Texas and Louisiana lines, with headquarters at Houston, and in 1926 he was advanced to assistant to the president. In 1927 he was elected executive vice president, the position which he held at the time of his retirement.

R. W. Barnes, chief engineer of the Southern Pacific Lines in Texas and Louisiana, at Houston, Tex., has been elected vice-president with the same head-

R. W. Barnes

quarters, succeeding Mr. Craft. Mr. Barnes was born at Edgewater, Colo., in 1887, and is a graduate of the University of Colorado. He entered railway service in 1912 as a draftsman and assistant engineer on the S. P., at Portland, Ore. In 1921 he was promoted to construction engineer of the Texas & New Orleans (a part of the Southern Pacific System), and five years later he was advanced to chief engineer of the Southern Pacific Lines in Texas and Louisiana, which position he held at the time of his recent appointment.

Leonard B. Allen, assistant vice-president—assistant to the president of the Chesapeake & Ohio, at Cleveland, Ohio, and an engineer by training and experience, has been elected vice-president, with the same headquarters.

Richard H. Carter, whose promotion to superintendent of the Mississippi division of the Illinois Central, with headquarters at Water Valley, Miss., was reported in the April issue, was born at New York on August 16, 1891, and received his higher education at the University of Ottawa. He entered railway service with the I. C., in September, 1914, as a chainman at Water Valley, subsequently serving as rodman, instrumentman, assistant engineer, track supervisor, assistant general yardmaster, and acting trainmaster and division engineer at various points on the road. In March, 1943, Mr. Carter was promoted to assistant terminal manager, with headquarters at Chicago, the position he held at the time of his new appointment.

Garrett B. Wall, Jr., whose promotion to assistant to the vice-president in charge of real estate, tax, magazine and legislative matters on the Chesapeake & Ohio, with headquarters at Huntington, W. Va., was reported in the April issue, was born at Richmond, Va., on September 17, 1903, and received his B. S. degree from Princeton University in 1925, entered railroading with the Chesapeake & Ohio in January, 1926, as a draftsman in the office of the chief engineer. In June, 1927, he was appointed assistant engineer, real estate department, transferring to the maintenance of way department at Richmond the following November. He was advanced to assistant division engineer at Ashland, Ky., in October, 1930, and two years later he was promoted to division engineer at Clifton Forge, Va., the post he held at the time of his recent appointment as assistant to the vice-president at Huntington.

Engineering

Barton Wheelwright, chief engineer of the Central region of the Canadian National at Toronto, Ont., has been appointed chief engineer (operating) for the entire system, with headquarters at Montreal, Que., succeeding **Howard A. Dixon,** who has retired after 42 years of service.

Harold J. McKenzie, assistant chief engineer of the Southern Pacific Lines in Texas and Louisiana, has been promoted to chief engineer, with headquarters as before at Houston, Tex., succeeding **R. W. Barnes,** whose promotion to vice-president is reported elsewhere in these columns. Mr. McKenzie is succeeded by **Lee A. Loggins,** division engineer of the Houston division.

H. M. Booth, division engineer on the St. Louis-San Francisco at Ft. Scott, Kan., has been transferred to Springfield, Mo., succeeeding **E. L. Anderson,** whose promotion to assistant to the general manager was reported in the March issue.

R. E. Copper, assistant chief engineer of the Peoria & Pekin Union at Peoria, Ill., has been appointed acting chief engineer, with the same headquarters, succeeding to the duties of **E. H. Thornberry,** who has been granted a leave of absence.

Edward W. G. Chapman, superintendent of terminals of the Canadian National at Sydney, N. S., has been appointed engineer maintenance of way of the Atlantic region, with headquarters at Moncton, N. B.

T. E. MacMannis, division engineer of the Jersey Central Lines at Jersey City, N. J., has been appointed engineer maintenance of way, with the same headquarters, effective May 1, succeeding **S. L. Mapes,** whose promotion to assistant general manager is announced elsewhere in these columns.

J. P. Hiltz, Jr., whose appointment as engineer of track of the Delaware, Lackawanna & Western was reported in the April issue, was born at Baltimore, Md., and was graduated from Baltimore Polytechnic Institute in 1929, receiving his degree as bachelor of science in civil engineering from Carnegie Institute of Technology in 1934. He entered railroading with the Pennsylvania in June, 1934, as an assistant master carpenter, and served subsequently at Newport, Pa., Lancaster, and Washington, D. C. In February, 1935, he was appointed assistant supervisor of the Baltimore division in charge of drainage, and after transferring to Bordentown, N. J., Trenton, and Jersey City, he was promoted to supervisor at Enola, Pa., in January, 1940. The following October Mr. Hiltz went to Philadelphia, Pa., on special duty in the office of the comptroller. He became assistant agent in the real estate department at New York in June, 1941, and was appointed supervisor of track at Northumberland, Pa., on February 1, 1943. The next July, Mr. Hiltz was transferred to Jamaica, N .Y., where he remained until his recent appointment as engineer of track.

J. P. Hiltz, Jr.

Ernest R. Logie, engineer maintenance of way, Central region of the Canadian National, at Toronto, Ont., has been appointed chief engineer of that region with the same headquarters, succeeding Barton Wheelwright. **Horace Waldo Flemming,** district engineer of the Southern Ontario district, at Toronto, has been named engineer maintenance of way, Central region, with the same headquarters, succeeding Mr. Logie. **G. K. Fraser,** division engineer of the Belleville division, at Belleville, Ont., has been promoted to district engineer, at Toronto, succeeding Mr. Flemming, and **A. V. Johnston,** division engineer, at Hornepayne, Ont., has been transferred to Belleville, replacing Mr. Fraser. **J. E. Dumontier,** division engineer of the Laurentian division at Quebec, Que., has been transferred to the Levis division at Levis, Que., and **G. Sawyer** has been appointed acting division engineer at Quebec relieving Mr. Dumontier.

Guy H. Watson, whose retirement as engineer of track of the Boston & Maine, at Boston, Mass., was reported in the April issue was born at Lyndonville, Vt., on February 23, 1880, and was graduated from Norwich University. He entered railroading with the Boston & Maine in December, 1902, as a rodman, and after serving subsequently with the Pennsylvania and the Central Vermont as assistant engineer of construction and resident engineer, respectively, he returned to the Boston & Maine as assistant engineer in May, 1906. In July, 1915, he was appointed division engineer of the White Mountain division, and ten years later he transferred to the Portland division at Salem, Mass. Mr. Watson was promoted to assistant to the engineer maintenance of way, in April, 1927, and on July 1, 1938, he was advanced to engineer of track which position he held at the time of his retirement.

G. M. Helmig, who has been on leave of absence from the Missouri Pacific to serve on the U. S. Mission of Railways in Mexico, has been appointed division engineer, succeeding **J. M. Giles** who has been appointed assistant engineer in the office of the chief engineer, with headquarters at St. Louis, Mo.

W. G. Kemmerer, whose appointment as assistant engineer brides and buildings of the Pennsylvania's New York zone, with headquarters at New York, was reported in the March issue, was born at Camden, N. J., and was graduated from Purdue University with the degree of Bachelor of Science in Civil Engineering. He joined the Pennsylvania in April, 1913, as a draftsman on the Delaware division at Wilmington, Del., and served subsequently as transitman, assistant supervisor, bridge inspector, supervisor of

W. G. Kemmerer

track, and master carpenter on the Allegheny, Renovo, Pittsburgh, and Eastern divisions until 1929, when he was named assistant engineer in the office of the chief engineer maintenance of way, Western region, at Chicago, the position he held at the time of his recent appointment.

W. H. Shideler, master of trains and track of the Missouri-Illinois, a subsidiary of the Missouri Pacific, at Bonne Terre, Mo., has been promoted to superintendent-agent of the New Orleans and Lower Coast, also part of the Missouri Pacific System, with headquarters at Algiers, La.

William H. Jones, acting superintendent of the Slaton division of the Atchison, Topeka & Santa Fe, with headquarters at Slaton, Tex., and an engineer by training and experience, has been promoted to superintendent of the Southern Kansas division, with headquarters at Chanute, Kan.

Charles K. Bruce, whose promotion to bridge engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., was reported in the March issue, was born at Lincoln, Nebr., on February 14,

Charles K. Bruce

1888, and was graduated from Vanderbilt University in 1912. In November of the same year he entered railway service as a clerk of the Nashville Terminals, with headquarters at Nashville, Tenn., later serving as a draftsman in the chief engineer's office. In 1914 he went with the Nashville, Chattanooga & St. Louis as water supply engineer, with headquarters at Nashville. In November, 1916, Mr. Bruce returned to the L. & N., as a draftsman of the bridge department at Louisville, and in 1919 he was promoted to assistant engineer of the bridge department with the same headquarters. In October, 1943, he was advanced to associate bridge engineer, with the same headquarters, the position he was holding at the time of his new appointment as bridge engineer.

Raymond H. Mitchell, whose promotion to division engineer of the Terminal division of the Boston & Maine, at Boston, Mass., was reported in the April issue, was born at Woodsville, N. H., on June 1, 1899, and attended Norwich university. He entered railway service on June 16, 1917, as a chainman on the Boston & Maine, later serving as a draftsman and transitman. On March 16, 1929, he was promoted to assistant track supervisor at Portsmouth, N. H., being transferred to Rochester, N. H., later that year. Mr. Mitchell was further advanced to track supervisor at Rochester on March 20, 1930, being transferred to Portsmouth on December 1, 1931, and to Salem, Mass., on February 1, 1934. On November 1, 1938, he was promoted to assistant division engineer of the Portland division, with headquarters at Dover, which position he held until his recent promotion, effective February 24.

George Auer, Jr., assistant engineer in the office of the engineer maintenance of way—system of the New York Central, has been promoted to division engineer of the Eastern division, with headquarters as before at New York, succeeding **C. A. Maxeiner,** who has been transferred to Syracuse, N. Y., relieving **P. H. Winchester,** who retired from active service on May 1.

C. L. Crummett, assistant division engineer on the Chesapeake & Ohio, at Richmond, Va., has been promoted to division engineer of the Clifton Forge division at Clifton Forge, Va., succeeding **Garrett B. Wall, Jr.,** whose promotion to assistant to vice-president in charge of real estate, tax, magazine and legislative matters was reported in the April issue. **Erle T. Rucker,** supervisor of track at St. Albans, W. Va., has been advanced to assistant division engineer, replacing Mr. Crummett. Mr. Rucker was born at Blackwood, Va., on April 24, 1907, and was graduated in civil engineering from Virginia Military Institute. He entered railway service on July 1, 1928, as a rodman in the construction department of the C. & O., later serving successively as material accountant, masonry inspector and instrumentman at various points. On September 1, 1941, he was promoted to assistant engineer in the division engineer's office at Huntington, W. Va., and on May 11, 1942, he was advanced to assistant cost engineer at Huntington. On February 15, 1945, Mr. Rucker was promoted to supervisor of track at St. Albans, which position he held until his recent promotion to assistant division engineer at Richmond.

Track

A. Martin has been appointed roadmaster on the Canadian National at Smiths Falls, Ont., succeeding **A. V. C. Beausoleil,** who has retired from railway service.

J. L. Looney has been appointed roadmaster on the Canadian Pacific at Aroostook Junction, N. B., replacing **O. Gosselin,** who has been transferred to Sherbrooke, Que., succeeding **Joseph L. Gagnon,** deceased.

W. M. S. Dunn, supervisor of track on the Chesapeake & Ohio, at St. Albans, W. Va., has resigned to become general inspector of tracks of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio.

R. W. Worthington, recently returned from the armed services, has been appointed track supervisor on the Wyoming division of the Erie, at Dunmore, Pa., replacing **P. W. Scribner,** who has been appointed acting track supervisor at Susquehanna, Pa., relieving **J. L. Leonard.** Mr. Leonard has been appointed acting general roadmaster and safety supervisor of the Western district, with headquarters at Youngstown, Ohio, succeeding **N. E. Scribner,** who has been granted a leave of absence because of illness.

Lee R. Johnson has been appointed roadmaster of the Fifth track division of the Eastern division of the St. Louis-San Francisco, succeeding **E. V. Buster,** who has been transferred to the Fourth track division, with headquarters as before at Springfield, Mo., in place of **J. L. Hendrix,** who has been assigned to other duties.

Oscar R. Braden, whose promotion to terminal roadmaster on the Missouri-Kansas-Texas, at Parsons, Kan., was reported in the April issue, was born in Benton County, Mo., on January 18, 1886, and entered the employ of the Katy as a section foreman at Dewey, Okla., on March 1, 1920, later serving at Mound Valley, Centerville and Kincaid, Kan. He was transferred to Parsons, in June, 1938, remaining in that position until his recent appointment.

L. E. Smith, roadmaster on the Missouri Pacific, at Pueblo, Colo., has been promoted to master of trains and track of the Missouri-Illinois, a subsidiary of the Missouri Pacific, with headquarters at Bonne Terre, Mo., succeeding **W. H. Shideler,** whose promotion to superintendent-agent of the New Orleans and Lower Coast is reported elsewhere in this issue. Mr. Smith is succeeded by **J. E. Padgett,** a section foreman on the Central Kansas division of the Missouri Pacific.

Robert D. Rhyne, whose appointment to the position of general roadmaster of the Missouri & Arkansas was reported in the March issue, was born at Columbia, Mo., on April 25, 1911, and was educated in the public schools of Ste. Genevieve, Mo. Mr. Rhyne entered railway service in May, 1927, with the Missouri & Illinois. In April, 1928, he went with the St. Louis-San Francisco as a section laborer at Arcadia, Kan. In November, 1933, he was promoted to section foreman at Straus, Kan., and in December, 1935, he was made extra gang foreman, with headquarters at Ft. Scott, Kans. In October, 1937, Mr. Rhyne was made section foreman at Lockwood, Mo., and in December, 1943, he was again appointed extra gang foreman at Ft. Scott. In January of the present year he resigned from his position with the Frisco to become general roadmaster on the Missouri & Arkansas, with headquarters at Harrison, Ark.

Albert W. Anthony, whose appointment as supervisor of tracks, Southern district, of the New York, Ontario & Western, with headquarters at Middletown, N. Y., was reported in the April issue, was born in Susquehanna County, Pa., on November 21, 1891. He entered railway service on May 23, 1910, as a chainman on the N. Y. O. & W., at Carbondale, Pa., and in April, 1912, was advanced to rodman. Mr.

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Anthony was promoted to levelman at Middletown, N. Y., in September, 1915, and in June, 1917, was appointed a transitman. During the first world war he served overseas for 11 months with the 23rd Engineers, and in June, 1919, he returned to the N. Y. O. & W. as a transitman at Middletown, which position he held at the time of his recent promotion to Supervisor of Tracks.

Virgil I. Kessinger, whose appointment as roadmaster of the First district of the Southern Kansas division of the Atchison, Topeka & Santa Fe, at Chanute, Kan., was reported in the April issue, has been on military leave of absence from his position as roadmaster on the Santa Fe, at Independence, Kan., since March, 1942. Mr. Kessinger served with the 713th Railway Operation Battalion as officer in charge of track maintenance, rising to the rank of captain. Following 18 months' service in North Africa and France, he was returned to the United States, and in March was placed on inactive status because of ill health. Mr. Kessinger wears a unit citation and the award of the Legion of Merit.

Bridge and Building

J. W. McDonald has been appointed general foreman bridges and buildings and water service of the Eastern division of the St. Louis-San Francisco, with headquarters at Springfield, Mo.

Gerald A. Linn, assistant general bridge inspector on the Chicago & North Western system, with headquarters at Chicago, has been promoted to superintendent of bridges and buildings of the Iowa division, at Boone, Ia., succeeding **W. F. Meyers,** who has retired. Mr. Linn is succeeded by **Orval Rhoades,** a bridge and building foreman on the Western division of the Chicago, St. Paul, Minneapolis & Omaha, part of the North Western system.

Special

H. C. Propst, supervisor scales and weights of the Chesapeake & Ohio, has been appointed supervisor, merchandise and refrigeration service, at Richmond, Va. **C. P. Epps,** assistant supervisor merchandise and refrigeration service, has been promoted to supervisor scales and weights, at Richmond, relieving Mr. Propst.

Water Service

O. E. Mace, whose promotion to superintendent of water service of the Pere Marquette, at Grand Rapids, Mich., was reported in the April issue, was born on August 31, 1896, and was graduated from the University of Kansas as a chemical engineer. He entered railway service in 1926 as a chemist and field draftsman on the Chesapeake & Ohio. In 1928 he went with the Missouri Pacific as a chemist, and in 1930, he entered the employ of the Hocking Valley (now a part of the Chesapeake & Ohio) as a chemist, remaining in that capacity with the Hocking Valley and its successor, the Chesapeake & Ohio, until 1937, when he went to the Pere Marquette, also as a chemist.

Association News

Metropolitan Maintenance of Way Club

The annual meeting of the Metropolitan Maintenance of Way Club was held on April 26 at the Hotel Governor Clinton, New York. The speaker at this meeting was I. H. Schram, chief engineer maintenance of way, Erie, who addressed the members of the club on "The Erie Training Program".

American Railway Engineering Association

The association's booklet containing the assignments and personnel of committees for the current year was mailed to all committee members during the first week in April. A list of all committee chairmen and of the new assignments of the various committees, as contained in this booklet, was published in the April issue.

Three of the technical committees of the association have scheduled meetings in May. The Committee on Iron and Steel Structures will meet at Chicago on May 8 and 9, the Committee on Records and Accounts will hold a meeting in Washington on May 9 and 10, and the Committee on Maintenance of Way Work Equipment will meet at Chicago on May 15 and 16.

Two committees held meetings in April, the Committee on Track meeting at Chicago on April 12, and the Committee on Water Service, Fire Protection and Sanitation meeting at the same place on April 17.

Railway Tie Association

Having cancelled its previously planned Twenty-Seventh Annual Meeting, which had been scheduled tentatively at the Netherland Plaza Hotel, Cincinnati, Ohio, for May 8 and 9, the Executive committee of the association will meet at the Hotel Statler, St. Louis, Mo., on May 8. At this meeting, the committee will review the work of the association for the last year and will hear the annual reports of its officers and technical committees. The technical reports will cover the following subjects: The Checking and Splitting of Ties Before Being Placed in Track; The Checking and Splitting of Crossties in Track; New and Pending Legislation Affecting the Crosstie Industry; Efficient Manufacturing Practice and New Methods to Overcome the Shortage in Manpower; The Moisture Gradient as a Factor in Treatment of Crossties; Proposed Changes in Specifications; Timber Conservation; Concentration Yards; and Production Problems.

Wood-Preservers' Association

As the result of restrictions on conventions, the association cancelled previous plans for a usual annual meeting and held its 41st Annual Meeting by mail, supplemented by a special meeting of its Executive committee, which convened in Chicago on April 24. At both the morning and afternoon sessions of this meeting, which were presided over by Walter P. Arnold, technical director, Wood Preserving Division, Koppers Company, as president, papers on a variety of subjects relating to the work of the industry and reports of standing and regular committees were received and considered.

The Executive committee announced the election of officers for the ensuing year as follows: President, J. H. Bremicker, Pennsylvania, Philadelphia, Pa.; first vice-president, R. H. Rawson, consulting timber engineer, Portland, Ore.; second vice-president, A. J. Loom, general superintendent timber preservation and treating plants, Great Northern, Brainerd, Minn.; treasurer, re-elected, H. L. Dawson; members of the Executive committee, F. W. Gottschalk, technical director, American Lumber & Treating Co., Chicago; and G. A. Haggander, assistant chief engineer, Chicago, Burlington & Quincy, Chicago.

Maintenance of Way Club of Chicago

Completing a highly successful year, with a record over-all attendance and a new high point in membership, the club held its annual meeting, in Chicago, on April 23. Features of the meeting, which was attended by 209 members and guests, including 11 past-presidents as guests of honor, were an informal reception prior to the meeting proper, the election of officers for the ensuing year, and an address by A. C. Mann, vice-president, Purchases and Stores, Illinois Central System, Chicago, on Maintenance of Way Materials.

In the election of officers, C. C. Pelley, track supervisor, Illinois Central, was advanced from first vice-president to president; E. C. Vandenburgh, engineer of maintenance, Chicago & North Western, was advanced from second vice-president to first vice-president; Guy P. Palmer, engineer maintenance and construction, Baltimore & Ohio Chicago Terminal, was elected second vice-president; and Neal D. Howard, editor, *Railway Engineering and Maintenance,* was re-elected secretary-treasurer. In addition, S. H. Shepley, supervisor of track, Elgin, Joliet & Eastern; Roy Lumpkin, assistant maintenance engineer, Chicago, Rock Island & Pacific; and G. J. Slibeck, sales representative, Pettibone Mulliken Corporation, Chicago, were elected directors for a term of two years. The membership of the club at the end of the year was 439, the largest in the history of the club.

Bridge and Building Association

Satisfied that war conditions in the fall, no matter how favorable, will not permit the association to hold a regular three-day annual meeting, tentatively scheduled in Chicago on October 16, 17 and 18, the Executive committee of the association, at a meeting in Chicago on April 16, gave up previous tentative plans for a three-day meeting and will substitute, in lieu thereof, a one-day annual meeting. This substitute meeting, which will be held at the Hotel Stevens, Chicago, on October 17, has been designated an annual meeting to permit, under the Constitution of the association, the transaction of essential business and the election of officers for the year ahead. However, attendance at

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it will be restricted to the officers and directors of the association, the chairmen and vice-chairmen of technical committees, and to other members of the association within and about Chicago. The primary features of the meeting will be the presentation of the eight technical reports for the year, work on which is now well under way, and an election of officers.

Supplementing the personnel of technical committees as reported in the April issue, F. R. Spofford, assistant division engineer, Boston & Maine, Dover, N.H., has accepted the chairmanship of the Committee on The Use of Highway Trucks in Bridge and Building Work, and A. E. Bechtelheimer, bridge engineer, Chicago & North Western, Chicago, has become vice-chairman of the Committee on The Maintenance of Wood Bridges and Trestles, replacing Mr. Spofford in that capacity.

Again, in 1945, no Proceedings of the association will be published, but shortly following the annual meeting on October 17 all members will be furnished printed copies of the committee reports, supplemented by a statement of the activities at the meeting.

The next meeting of the Executive committee is scheduled to be held in Chicago on July 16, at which time preliminary drafts of all of the committee reports will be reviewed, looking to their presentation in final form at the meeting on October 17.

Roadmasters' Association

Meeting in Chicago on April 7, the Executive committee of the association, convinced that continued heavy train travel and the present ban on conventions will not permit the holding of a regular three-day annual meeting in September, decided to hold a one-day annual meeting, at the Stevens Hotel, Chicago, on September 12. While designated an annual meeting to permit the transaction of certain essential association business and the election of officers, this meeting will be definitely restricted in character, open alone to officers and directors, the chairmen and vice-chairmen of technical committees, and those other members who can attend without interfering with their work and without train travel.

The most important function of the restricted meeting will be to pass upon the five technical committee reports to come before the association, looking to the distribution of these reports to members at the earliest possible date. Without plans for an annual Proceedings again this year, printed copies of the reports, together with a statement of the activities at the one-day meeting, will be mailed to all members of the association shortly after the meeting.

The subjects to be reported on this year, together with the personnel of the various committees to make report, are as follows:

No. 1—Stabilization of Roadbed—J. R. Rushmer (chairman), rdway. engr., A.T.&.S.F., Amarillo, Tex.; A. B. Chaney (vice-chairman), dist. engr., M.P., Little Rock, Ark.; W. S. Broome (vice-chairman), engr. m. of w., Col. & Sou., Denver, Colo.; F. L. Etchison, engr. m. of w., A.C.L., Savannah, Ga.; Paul F. Muller, rdm., C.&W.I., Chicago; E. J. Brown, engr. trk., C.B.&Q., Chicago; A. W. Schroeder, supvr. extra gangs, C.B.&Q., Chicago; W. H. Hillis, oper. officer, C.R.I.&P., Chicago; J. C. Jacobs, div. engr., I.C., Water Valley, Miss.; R. E. Vermillion, rdm., M.P., Sparta, Ill.; S. B. Ringgold, ch. engr., Miss. Cent., Hattiesburg, Miss.; Houston Jarrell, rdm., N.O.&L.C. (M.P.), New Orleans, La.; Charles Weiss, supvr., Penna., Valparaiso, Ind.; H. W. Kellogg, div. engr., P.M., Saginaw, Mich.; J. C. West, div. engr., A.T.&S.F., Slaton, Tex.; R. L. Griffin, rdm., S.A.L., Monroe, N.C.; G. S. King, supvr. trk., Sou., Gainesville, Ga.; R. L. Fox, rdm., Sou., Alexandria, Va.; A. W. Werner, rdm., S.P., Lake Charles, La.; G. B. McClellen, gen. rdm., T.&P., Alexandria, La.; W. B. Lee, div. engr., W. M., Cumberland, Md.; R. L. Longshore, instrmn., W.P., San Francisco, Cal.; and M. W. Rector, v.p. & g.m., W. H. Nichols Co., Inc., Dallas, Tex.

No. 2—Field Repairs and Maintenance of Work Equipment, Including Motor Cars—W. E. Chapman (chairman), div. engr., C. of G., Columbus, Ga.; C. Halverson, div. rdm., G.N., Willmar, Minn.; J. M. Reardon (vice-chairman), trk. supvr., N.Y.N.H. & H., Hartford, Conn.; L. J. Gilmore, gen. rdm., G.N., Spokane, Wash.; W. H. Sparks, gen. insp. trk., C.&O., Russell, Ky.; A. Fernandez, dist. rdm., G.N.; Breckenridge, Minn.; R. H. Gilkey, div. engr., C. of G., Savannah, Ga.; Armstrong Chinn, gen. mgr., Alton, Chicago; A. E. Botts, asst. engr. m. of w., C.&O., Richmond, Va.; W. H. Moore, supvr. wrk. equip., Sou., Charlotte, N.C.; A. R. Kastella, motor car reprmn., G.N., Whitefish, Mont.; F. H. McKenney, dist. engr. m. of w., C.B.&Q., Omaha, Neb.; J. J. Mitchke, fore. motor car shop, G.N., Everett, Wash.; N. D. Howard, editor, *Railway Engineering and Maintenance*, Chicago; A. L. Lowe, supvr., B.&O., Parkersburg, W. Va.; T. F. Scholes, trk. supr., Penna., Reading, Pa.; M. C. Taylor, supvr. wrk. equip., L.&N., Louisville, Ky.; A. J. Wolfe, supvr. m. of w., C.P.R., Winnipeg, Man.; and M. Irelan, rdm., C.B.&Q., Central City, Neb.

No. 3—Modern Methods of Right-of-Way Grading—A. G. Reese (chairman), dist. engr., C.B.&Q., Galesburg, Ill.; R. T. Henderson (vice-chairman), rdm., S.P., Niles, Cal.; C. Halverson (vice-chairman), div. rdm., G.N., Willmar, Minn.; M. D. Carothers, ch. engr., Alton, Chicago; C. R. Schoenfield, rdm., C.B.&Q., Aurora, Ill.; John E. Gault, rdm., C.I.&L., Lafayette, Ind.; C. Kratoska, rdm., C.&N.W., Ames, Iowa; Charles Pfeifer, rdm., E.J.&E., Joliet, Ill.; R. C. Williams, asst. rdm., Ft. W.&D.C., Amarillo, Tex.; W. R. Payne, rdm., M.P., Conway Springs, Kan.; A. E. Hendrix, trk. supvr., Sou., Durham, N.C.; W. C. Peters, rdm., A.T.&S.F., Newton, Kan.; C. F. Edwards, div. engr., C.&O., Columbus, Ohio; G. S. Turner, div. engr., D.&R.G.W., Pueblo, Colo.; J. S. Vreeland, eastern editor, *Railway Engineering and Maintenance*, New York City; M. R. Black, asst. div. engr., L.&N., Evansville, Ind.; R. W. Lucas, rdm., C.R.I.&P., LaSalle, Ill.; and W. B. Bailes, trk. supvr., Sou., Strasburg, Va.

No. 4—Prevention of Damage to Rail—J. E. Fanning (chairman), asst. to ch. engr., I.C., Chicago; R. E. Cramer (vice-chairman), research engr., Talbot Lab., Univ. of Ill., Urbana, Ill.; R. W. Bonney (vice-chairman), gen. rdm., S.A.L., Jacksonville, Fla.; M. P. Whiteman, gen. insp. trk., A.&W., and W. of A., Montgomery, Ala.; J. G. Gilley, div. engr. C.&O., Richmond, Va.; H. P. Mason, trk. supvr., B.&.M., Boston, Mass.; W. O. Frame, supt., Ft. W. & D.C., Wichita Falls, Tex.; Adolph O. Holm, dist. rdm., G.N., Interbay, Wash.; L. L. Wallis, rdm., M.P., El Dorado, Ark.; I. D. Talmadge, dist. engr., N.Y.O.&W., Middletown, N.Y.; C. T. Nix, asst. rdm., S.A.L., Lake City, Fla.; E. A. Eastin, supvr. trk., C.&O., Peru, Ind.; J. A. Rust, rdm., Sou., Greenville, S.C.; W. E. Manning, trk. supvr., Sou., Blackville, S.C.; E. E. Earl, div. engr., S.P., Bakersfield, Cal.; T. F. King, rdm., Sou., Ashville, N.C.; W. O. Gilmer, rdm., S.A.L., Yulee, Fla.; and J. A. Stonebraker, rdm., A.T.&S.F., Abilene, Kan.

No. 5—Yard Maintenance Under Extraordinary Traffic—H. Charles Koch (chairman), rdm., Belt Ry. of Chicago, Chicago; V. E. Pearson (vice-chairman), rdm., S.P., Sacramento, Cal.; P. L. Koehler (vice-chairman), trmstr., C.&.O., St. Albans, W. Va.; A. B. Hillman, engr. m. of w., C.&W.I., Belt Railway of Chicago; E. H. Masters, ch. engr., E.J.&E., Joliet, Ill.; R. S. Marshall, dist. rdm., G.N., Superior, Wis.; N. F. Alberts, gen. fore., C.M.St.P.&P., Chicago; V. V. Holmberg, supvr. b.&b., C.&W.I., Chicago; Lee Spencer, Phoenix, Ariz.; S. J. Caesar, trk. supvr., C.W.P.&S., Chicago; E. E. Crowley, rdm., D.&H., Albany, N.Y.; and H. D. Van Vranken, asst. div. engr., S.A.L., Jacksonville, Fla.

Supply Trade News

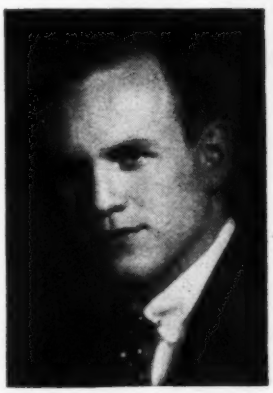
General

The **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis., has prepared, for distribution among its foremen, a manual outlining some of the problems now being met in the readjustment of returning war veterans to civilian occupations. The manual, which cites specific problems, along with the methods used to solve them and the results, stresses the importance of proper understanding of readjustment difficulties by foremen as the first and most important step in a successful transition from military to civilian jobs.

Details of a plan for the re-employment of returning war veterans have been announced by **Johns-Manville Corporation,** New York. The plan includes interviews with trained advisors, themselves largely ex-servicemen, to determine each veteran's skills, desires, and abilities; placement in his former position, a better one if available and the veteran is qualified, or a special one if necessitated by his disability; a systematic follow-up of each returning man's record in his new position to insure that successful readjustment is made. In addition, detailed study and analysis of all jobs are being made to determine which can be performed by men who may return from service with physical handicaps.

Personal

Walter I. Floyd, executive vice-president of the **Duff-Norton Manufacturing Company,** Pittsburgh, Pa., has been elect-



Walter I. Floyd

ed president, succeeding **Robert G. Allen,** who has resigned. **E. M. Webb** has been elected vice-president and general manager.

M. T. Deames, who has been with the **Caterpillar Tractor Company,** Peoria, Ill., since 1929, has been appointed assistant general parts manager. The following men have been appointed to assist Mr. Deames as parts managers: **A. H. Yingst,** for export and government sales; **T. H. Hodgins,** for the central sales division;

(Continued on page 506)

THEY HOLD THE RAIL IN POSITION

against excessive OUTWARD PRESSURE

THE Morrison Adjustable Gauge Holder now in use on many Class 1 Railroads is positive in action... it is engineered to make the rail "stay put" against excessive outward pressure. It does this job by absorbing wheel pressure against the outside rail on curves... thus eliminating the enlargement of spike holes in ties. Its benefits are three fold:

1. **Prolongs the service life of ties and spikes.**
2. **Holds the rail in place and maintains gauge.**
3. **Reduces maintenance costs by eliminating frequent regauging and respiking.**

Morrison Gauge Holders are inexpensive and should be applied on the inside of the outer rail on high speed curves; yard curves and turnout tracks. In addition, Morrison Gauge Holders are very effective in holding guard rails in place... being applied on the outside of the stock rail with the tension rod clamped around the inside base of the guard rail. Write for descriptive literature and prices.

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EXECUTIVE OFFICES . . . BUFFALO 12, N. Y.
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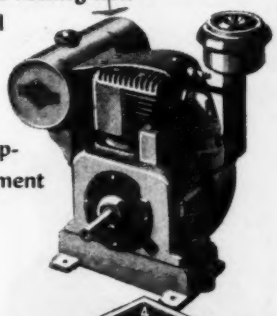
Through more than 25 years' *continuous* production, Briggs & Stratton has pioneered improved design, engineering advancements, and precision manufacture of *air-cooled* gasoline engines. Today, Briggs & Stratton 4-cycle air-cooled engines are making a vital contribution to the war effort through an ever-increasing variety of standard and special applications. By their dependable performance, they are living up to their long-established reputation as "the world's finest small air-cooled engines."

Everywhere they are setting new records that foretell greater future utility through wider uses of gasoline powered appliances and equipment than ever before!



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BRIGGS & STRATTON
GASOLINE ENGINES

In your plans for the future, you can profit by the long experience which has made this performance record of Briggs & Stratton air-cooled engines possible — whether you manufacture, sell or use gasoline-powered equipment or appliances.

Briggs & Stratton Corp., Milwaukee 1, Wis., U.S.A.

C. M. McKnight, for the western sales division, and **B. W. Kramm** for the eastern sales division. **E. L. Mason, H. F. Haven,** and **C. D. Byrns** have been appointed assistant parts managers of the central, western and eastern sales divisions respectively.

William A. Maxwell has been appointed Chicago district sales manager of the **Ramapo Ajax Division,** American Brake Shoe Company. Mr. Maxwell was born

William A. Maxwell

in Valparaiso, Neb., and was graduated from the University of Nebraska. In 1917, he entered the employ of the P & M Company, becoming general sales manager in 1931, at Chicago. With the exception of a period of service in the navy during World War I, his entire career, up to the time of his recent appointment, has been with the P & M Company.

Kenneth I. Thompson, for many years active in the railroad supply business, has been appointed eastern sales manager of the **Oxweld Railroad Service Company,** with headquarters at New York. Previ-

Kenneth I. Thompson

ously Mr. Thompson was western sales manager of the railroad department of the **Ingersoll-Rand Company.** Born at Bridgeport, Conn., on March 28, 1904, he was graduated from the Staunton Military Academy, Staunton, Pa., and in 1921 he entered the railway supply field as a salesman of the Pennsylvania Pump & Compressor Co. A short time later he went with the Fuller Lehigh Company, and in 1937 he returned to Ingersoll-Rand, remaining with that firm until his new appointment as eastern sales manager with the Oxweld Company.

John N. Thorp, formerly manager of the Construction Equipment division, Chicago Pneumatic Tool Company, New York, has formed his own company, the **John N. Thorp Company,** New York, to handle construction equipment and railway supplies.

William F. Tuttle, assistant to the manager of the East Works plant of the **American Rolling Mill Company,** Middletown, Ohio, has been promoted to assistant chief engineer, general engineering division.

Paul Wayman, general superintendent of plants, and **J. Gardner Coolidge, eastern** district manager, at Boston, Mass., have been elected vice-presidents of the **American Lumber & Treating Co.,** Chicago, and **H. H. Humphreys,** has been named secretary-treasurer, succeeding **H. B. Horton,** who has resigned.

J. R. Graham has been appointed field manager of the Chicago territory of the Railway Equipment division of the **Nordberg Manufacturing Company,** Milwau-

Photograph by Bachrach

J. R. Graham

kee, Wis., with headquarters in Chicago. Mr. Graham was formerly supervisor of maintenance of way equipment on the Illinois Central.

Gordon Gage, general superintendent of the Butler, Pa., division of the **American Rolling Mill Company,** Middletown, Ohio, has been promoted to manager of the Butler division, succeeding **Harry Holiday,** who has resigned because of ill health. **Roy P. Tooke,** assistant chief of the general engineering department, at Middletown, has been advanced to general superintendent at Butler, relieving Mr. Gage.

Esty Foster, whose election to president of the **National Lock Washer Company,** Newark, N. J., was reported in the March issue, joined the company as executive vice-president in May, 1944, from Ford, Bacon & Davis, Inc., engineers, of New York. For three years he had served in Washington on leave of absence as operations adviser, and in other positions, with the Office of Production Management, the War Production Board and the combined Production and Resources Board. He was formerly a member of the faculty of the Graduate School of Business Administration, Harvard University, and a special engineer in the office of the assistant to the president, and of the inspecting engineer of the New York Central.

George R. Carr, chairman of the executive committee of the **Dearborn Chemical Company,** Chicago, has been elected chairman of the board of directors, succeeding Robert F. Carr, whose death on January 27 was reported in the February issue. Mr. G. R. Carr was born at Argenta, Ill.,

George R. Carr

on January 23, 1877, and was graduated from the University of Illinois in 1901. Two weeks after graduation he joined the staff of Dearborn as a salesman and served successively until 1922 as assistant general manager and general manager. In 1922 he was elected vice-president and general manager, which position he held until February, 1944, when he was elected chairman of the executive committee, the position he held at the time of his new promotion.

M. P. Brown has been elected vice-president in charge of sales of the **Taylor-Colquitt Company,** with headquarters at Spartanburg, S. C.

S. L. Myers, vice-president in charge of export sales of **LaPlant-Choate Manufacturing Company,** Cedar Rapids, Ia., has been appointed vice-president and general sales manager, succeeding **H. H. Buchanan,** who has resigned.

Obituary

Walter Ewing Miller, who retired as vice-president and treasurer of Fairbanks, Morse & Co., Chicago, in 1929, died recently in St. Luke's Hospital, Chicago, after a brief illness. Mr. Miller, who was 81 years old, joined the organization in 1887 and was one of the original incorporators of the company in 1891.

Nordberg Manufacturing Co., Milwaukee, Wis., has published an attractive, well illustrated, 16-page brochure entitled "Nordberg Produces for Victory". This booklet describes the products that the company is producing to further the war effort, together with reference to all of the Nordberg maintenance tools designed to aid the railroads in maintaining their tracks in good condition.

400,000

GALLONS OF WATER DAILY

For Park College and City

For more than forty years Park College struggled to serve itself and the City of Parkville, Missouri, with water. The water system was inadequate and inefficient to operate. For many years it imposed a heavy financial loss on the college. Furthermore, seldom was an ample supply of water available. Frequently it was necessary to haul water from another city ten miles away.

And then in 1941 the situation became even more critical. Both resident and college use had to be cut to the absolute minimum. By vote, the citizens approved an ordinance granting Layne-Western Company a franchise for taking over and operating the water system. Two new Layne Well Units consisting of Layne Gravel Wells and vertical turbine pumps, capable of producing 400,000 gallons of water daily, were immediately installed. A modern iron removal and water treating plant was rushed to completion.

Today, Park College and the City of Parkville have a thoroughly modern and highly efficient water system with a capacity far greater than their needs. The water is clearer and finer than ever before . . . and all at a tremendous annual saving to the College.

For further facts about Layne Water Systems, Layne Turbine Pumps and Layne Services, address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

***LAYNE PUMPS**—fulfill every need for producing large quantities of water at low cost from wells, streams, mines or reservoirs. Send for literature.*

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

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WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

AND....IN *five* MINUTES

this DUGAS EXTINGUISHER will be ready for the NEXT FIRE!

● You need never be unprepared for a second fire when DUGAS Fire Extinguishers are used . . . because you can *EASILY, QUICKLY* recharge them, on the spot.

As soon as one fire is killed, you have only to refill the chamber with PLUS-FIFTY DUGAS Dry Chemical, slip in a fresh cartridge, and IMMEDIATELY you're ready for the next, which might occur *ANYTIME.*

DUGAS Extinguishers require minimum maintenance because they need no periodic recharge. In arctic cold or tropic heat, they retain their fire fighting effectiveness.

Easy to handle and operate . . . these portable DUGAS Extinguishers give the fire fighter maximum protection because the dry chemical rolls up a heat-shielding screen in front of him as he moves in to snuff out the fire.

Constant fire protection like this can be yours. Write today for further information.

Approved by Underwriters' Laboratories, Factory Mutual Laboratories, and Governmental Agencies.

AN ANSUL PRODUCT
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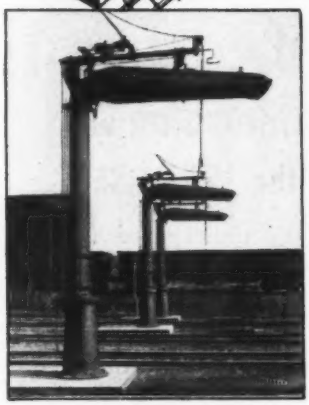
THE MASTER OF FLAME

DUGAS 15-T HAND EXTINGUISHER

DUGAS 150 WHEELED EXTINGUISHER

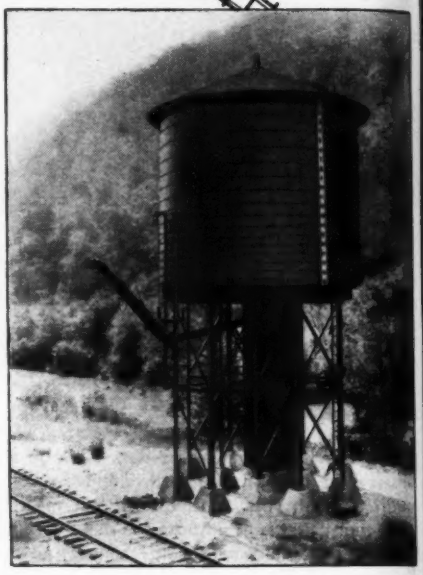
ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN
DUGAS DIVISION

TANKS are in the service for America & its railroads



More than 90 years ago U.S. Water Tanks began to dot the railroad rights of way of America. Today, U.S. Tanks built from experience gained over those 90 years are helping the railroads perform their transportation miracles. We like to feel that our desire to build better tanks is now resulting in long, service-free operation that releases limited manpower for necessary work along the line.

For the best, be sure to specify U.S. on your next order for water tanks, water columns, semaphores, switch stands, or valves.



U. S. ENGINE & PUMP CO.

DIVISION OF BATAVIA METAL PRODUCTS, INC.

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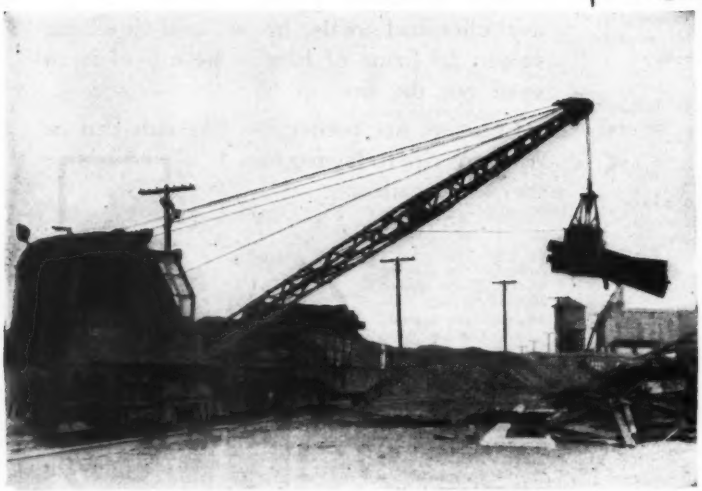
BURRO CRANES



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Your Burro can turn out its quota of day after day track and yard work and an endless number of special jobs too—wherever materials are to be lifted or placed, tracks layed, bridges built, piles driven, ballast spread, or for any of the other types of loading or unloading jobs—the Burro Crane can do it better, cheaper, easier and faster. Here's why:

- Travels under its own power. Draw bar pulls up to 7500 lbs. Elevated boom hauls for working over high-sided gondola cars.
- Low enough to travel anywhere on a flat car—lifts itself off track and on again in a few minutes—never holds up traffic.
- Accessories available include pile drivers, magnets, buckets and drag lines.
- For yard work it's tops—small, compact, economical and powerful, truly a Burro for work. Rugged, sturdy in construction, will give years of reliable service.

Write for Bulletin F-115 and F-120

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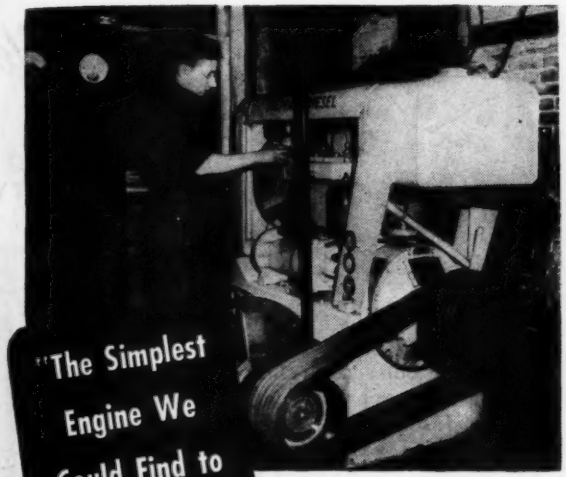

"The Simplest Engine We Could Find to Do Our Job"

SAYS HENRY RIEHL & SON OF PHILADELPHIA

"Power for the entire machine shop of Henry Riehl & Son of Philadelphia, Pennsylvania, is supplied by one Model #6 25-horsepower, Sheppard Diesel which was installed in June, 1941, and has been running nine hours a day, six days a week, ever since. The company manufactures narrow fabric textile machinery, working in both metal and wood. The various machine shops are housed in several adjoining buildings and on several floors, and contain both standard and special woodworking machines as well as a completely equipped machine shop. There is a total of eighty machines, the power for all of which is supplied by the Sheppard Diesel. (Note: The machines are never all in operation at the same time.) The Sheppard Diesel was chosen because, in the words of Theodore H. Wagner, one of the partners in the firm, 'it was the simplest engine we could find that would do the work.' Moreover, their own employees are able to fix minor troubles when and if they arise, without the necessity of calling in experts for maintenance work.

"Dependability, cheapness of power, low maintenance cost and quick starting, with power available when needed and shut off when not needed, were the characteristics required by Henry Riehl & Son, and the Sheppard Diesel amply fills these requirements. No other engine was previously used for power, and commercial power could readily be bought, but at greatly increased cost. Figures are not available to demonstrate accurately the savings that have been realized, but Mr. Wagner states that 'the Sheppard Diesel has paid for itself in the time we have had it.' When asked the opinion of the plant management concerning the performance of this engine, Mr. Wagner said, 'we think so much of it that we're going to order a larger unit.' He had particular praise for the efficiency and promptness of the Service Department of R. H. Sheppard Company.

"Last December the engine was overhauled, after three and a half years of service, and is now in new working condition. Apart from this overhaul, there has been no major expense for maintenance or repair."

Your priority may entitle *you* to a Diesel right now. Do as Riehl did—specify Sheppard and let the Diesel pay for itself. Write today for free bulletins and advice about obtaining WPB approval.

POWER UNITS; 8 TO 50 HP • GENERATING SETS; 3 TO 30 KW

Sheppard ALL AMERICAN DIESEL POWER UNITS

R. H. Sheppard Company, 1136 Middle St., Hanover, Pa.

Please send me free literature describing Sheppard Diesel Power Units.

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ADD EASE SPEED and PRECISION to HEAVY SAWING

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MODEL 120

2 POWERFUL MODELS

Available for 110-volt A.C. or D.C.; 220-volt A.C. or D.C.

MODEL 120—
12" blade, 4½" cutting capacity

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★ **This 12" MallSaw is built for extensive sawing of heavy lumber and timber. High speed, heavy duty motor withstands hard, continuous usage—has power to spare.**

★ **Light weight—perfectly balanced—easily adjusted for depth or bevel cuts. Takes waste motion, fatigue and backaches out of heavy cutting jobs.**

★ **Extra speed reduces sawing time—accurate cuts assure square board ends and better fitting parts—multiple cutting of like members speeds construction.**

★ **Can be used for cross-cutting, ripping and bevel cuts to 45 degrees. Also operates an abrasive wheel for cutting non-ferrous metal, cutting and scoring tile, stone and concrete.**

Other MALL Portable Power Tools include Cross Slotters, Gasoline Engine, Pneumatic and Electric Concrete Vibrators and Surfacers, Gasoline Engine, and Pneumatic Chain Saws, Electric Circular Saws, Electric Drills, Flexible Shaft Machines with attachments for sanding, grinding, polishing, wire brushing, buffing and drilling. Write for complete catalog to

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Dependable... Portable Power for Railroads

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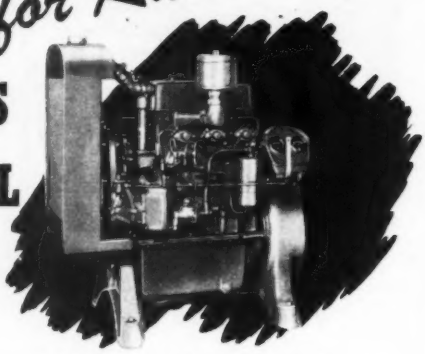
DIESEL

3 to 15 H.P.



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If need for a small, dependable Diesel has caused you to specify other types of power, Atlas engines are your solution. These stamina-packed units are backed by over 40 years of engine building experience. They are ideal for night operations lighting . . . have the lasting qualities needed to drive water drainage pumps . . . use less fuel. The Atlas Lanova Diesel gives you

EFFICIENT POWER FOR . . .

★ *Air Compressors*	*Emergency Service*
Hoists	*Small Conveyors*
Water Service	*Portable Tools*

And there are 30 to 600 H.P., long-life Atlas Diesels to meet your greater power needs. You can have the fact-crammed Atlas Diesel story for your power data file, immediately. If you'll write stating your power problem, we'll answer by return mail.

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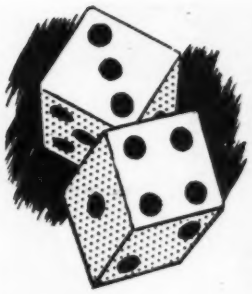

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When it comes to safety lights for hazardous locations there's no second choice . . . it's Safety First . . . and the safety approved electric lantern or flashlight is a . . . Justrite.

Railroad Type Safety Lantern

The "Trainman's Favorite." Powerful "spot" beam for reading car numbers or signaling a long drag . . . other bulb is extended further to provide for regular signaling. Tough and sturdy construction . . . easy replacement of parts. Safety "kick-out" bulb sockets and "sparkproofed" guard as required by highest safety authorities.

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The new 1500 candlepower flashlight that has won instant approval as a safety approved general utility light. Has all the famous Justrite Safety Features sealed in a sturdy plastic case . . . three standard cells for dependable service. This mighty midget fits in the palm of the hand, on belt clip or stands alone on a flat surface. Uses low drain bulbs that increase the light power and at the same time gives longer battery service.

Model No. 17-S

All-Purpose Electric Lantern

A rugged dependable light. "Twin-bulbs" insure against light failure . . . "kick-out" bulb socket for safety. A fixed guard protects the face of the lantern. A movable guard, that also acts as a base, and an adjustable handle allows the light to be adjusted at any angle. Guards are sparkproofed for safety. All parts made of the finest material for long wear and service . . . Justrite.

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These Justrite Portable Electric Lights are listed for safety by Underwriters' Re-examination Service, Class 1 Group D., and approved by U.S. Bureau of Mines for use in methane gas and air mixtures...your guarantee of safety... Justrite.

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JUSTRITE *Safety Products*

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APPROVED SAFETY ELECTRIC LANTERNS

"YES, I KNOW STERLING ROCK SALT IS THE IDEAL, NON-POISONOUS WEED KILLER . . .

". . . but how can we distribute it economically on rights-of-way?"

THAT'S just what we are prepared to give you and all other interested railwaymen . . . the *whole* story of Sterling Rock Salt and its economical application as a quick, reliable weed killer! Also, facts about its efficient distribution and the results it achieves . . . in keeping roadbeds *completely* free of all vegetation . . . and thus eliminating fire hazards and drainage difficulties.

So—send for detailed information on how to spread Sterling Rock Salt on your roadbeds—today! We know you will find it worth your while.

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Here they are—data that show how easily and economically you can build an efficient spreader for applying Sterling Rock Salt! Get the Sterling story of *safe* elimination of weeds from rights-of-way...and the prevention of further weed growths. Data and descriptive literature are yours upon request without cost or obligation. Just fill out and send in coupon below.

International Salt Company, Inc.
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Please send details and factual literature showing how and where Sterling Rock Salt is easily and economically applied to rights-of-way for weed elimination.

*Name*_____

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*Street*_____

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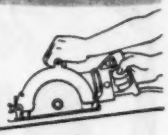
Sterling
ROCK SALT
Eliminates Weeds

INTERNATIONAL SALT COMPANY, INC., Scranton, Pa.

SMALLER CONSTRUCTION CREWS
FINISH BIGGER JOBS
SOONER WITH . . .



FASTER-CUTTING
SKILSAWS

Maintenance work gets done faster on bridges, trestles, loading platforms and construction jobs of every type when SKILSAWS are on hand to speed every cut up to 4⅜ in. deep. SKILSAWS operate from power lines, portable generators or on compressed air, go right to the job, save time, labor, material handling. Ask your distributor today for a demonstration.

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PORTABLE ELECTRIC
SKILTOOLS
MADE BY SKILSAW, INC.

We have the ANSWER *to Your* ROOF PROBLEMS

● *NOW* is the time to *resurface* and *repair* worn and leaky roofs, flashings and gutters.

It's Simple, Easy and Quick with

STONHARD PLASTIC ROOF RESURFACER

CAN BE APPLIED WHILE ROOF IS WET

★ Completely prepared — Use it just as it comes from the drum.

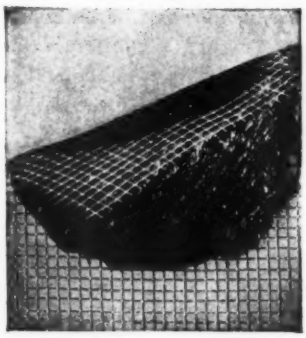
★ Covers any type of roof surface.

★ Will not check, crack or peel off.

ORDER A DRUM NOW

LASTING PLIABILITY

The photograph at the right shows a thin coat of STONHARD PLASTIC ROOF RESURFACER over a piece of heavy screen. After 18 months' exposure to weather, screen was twisted back and forth until every wire broke, but the RESURFACER showed no loss of elasticity.



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Building Maintenance Materials

Since 1922

401 N. BROAD ST., PHILADELPHIA 8, PA.

MAIL THIS COUPON NOW FOR FREE FOLDER, "HOW TO GET MORE SERVICE FROM YOUR ROOFS."

STONHARD COMPANY
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Sirs: Please send us your new FREE folder, "How to Get More Service From Your Roofs."

FIRM_____

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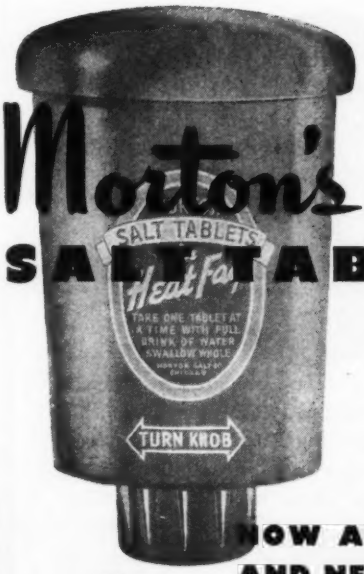
CITY_____ ZONE_____ STATE_____

MR._____ TITLE_____

Morton's SALT TABLETS



NOW AS FAMILIAR AND NECESSARY AS THE LUNCH PAIL . . .

It's the exceptional industrial plant that fails to provide salt tablets for its employees. Only a few years ago it was otherwise. Salt Tablets have become an industrial "must" for men who work — and sweat. Sweat robs the body of vital salt. This throws the body fluids out of balance. The result is Heat-Fag, inalertness, accidents, heat prostrations. The preventive is salt and water—water to restore the moisture lost in sweat, salt to restore the saline balance. Water alone won't do it. Both are needed.

The easy, simple, sanitary way to provide salt to workers who sweat is Morton's Salt Tablets available at every drinking fountain. The cost is less than a cent a man per week.

In salt tablets, as with other grades and types of salt, Morton is the recognized leader. Order Morton's Salt Tablets and Dispensers from your distributor or directly from this advertisement. Write for free folder. Morton Salt Company, 310 S. Michigan Ave., Chicago 4.

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly — no waste. Sanitary, easily filled, durable.

800 Tablet size, $3.25

MORTON'S SALT TABLETS

Morton's Salt Tablets are available either plain or with dextrose.

Case of 9,000, 10-grain salt tablets - $2.60

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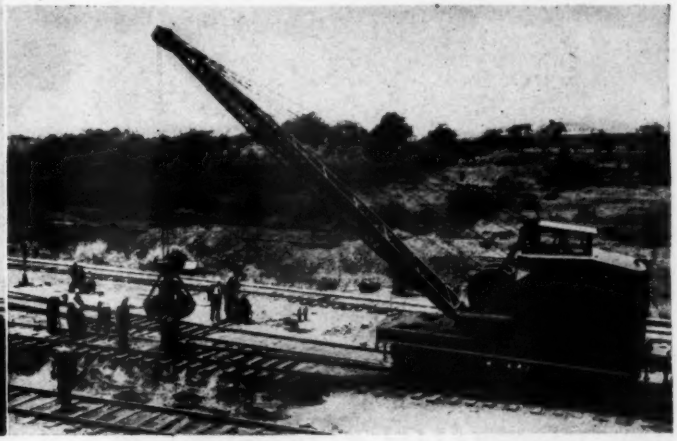
MORTON'S SALT TABLETS

DO YOU NEED RELIABLE EQUIPMENT TO MOVE MATERIALS ECONOMICALLY?

No matter what your particular material handling problem may be, I.B. equipment can solve it efficiently. Big durable I.B. locomotive cranes, tower cranes, car dumpers, coal and ore bridges and pile drivers are doing outstanding jobs every day in scores of industries. Write for complete facts. Left: An I.B. car dumper capable of handling cars up to 120 tons capacity. Below. An I.B. locomotive crane known the world over for its reliable, low cost operation with magnet, hook or bucket.



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PAVING BREAKERS

100% Self-Contained

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one quick pull
of the rope.

Extremely Portable

Ruggedly Constructed

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No Battery Box
and Cable

No Springs

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Particularly suited to ... and maintenance of way. ● "CHROME CLAD" means covered with chrome. The steel line has an outer coat of smooth, hard chrome—a regular "Life Jacket"—protection against wear. ● EXTRA STRONG—built up by platings. ● WILL NOT CRACK, CHIP, OR PEEL. ● EASY TO READ—Jet black, accurate markings against light, non-glare chrome background. ● Perforated metal disk reel. ● Write for catalog 12.

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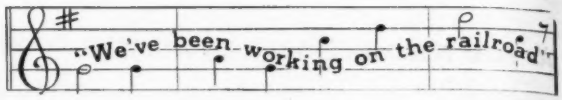
TAPES · RULES · PRECISION TOOLS



Section crews *like* to work with the BLOXHAM Track Liner *because*

. . . it's easy to operate . . . just a straight pull on the rail. No lifting, stooping or "heeling up". A "natural" for faster and more accurate rail aligning.

A profitable volume-selling item for supply houses to handle. Write for dealer proposition.

Write for details and prices

CHICAGO STEEL FOUNDRY COMPANY

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FOR main water supply and water distribution; particularly suited for metering water pumped from wells; streamline Venturi design. Ideal for pacing chemical feeders in treatment of water supplies. Send for Bulletin 350 and complete information. Address Builders-Providence, Inc., (Division of Builders Iron Foundry), 35 Codding St., Providence 1, R. I.

Sincerely

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Use this section when seeking a new man, new position, or when buying or selling secondhand equipment.

CLASSIFIED ADVERTISEMENTS, $10.00 an inch, one inch deep by three inches wide, an insertion.

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Remittance must accompany each order.

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Wanted—Sales Engineer

Manufacturer of heavy excavating and material handling equipment—Shovels, Cranes and Dragline, will employ a man thoroughly familiar with railway engineering and maintenance-of-way problems, for sales engineering work with railroads.

Write, giving full information as to age, experience, education and compensation desired. Reply Box No. 545, Railway Engineering and Maintenance, 105 W. Adams, Chicago 3, Illinois.

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FREEDOM—from water shortage
FREEDOM—from excessive power bills
FREEDOM—from pump breakdowns
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PEERLESS PUMP DIVISION
Food Machinery Corporation

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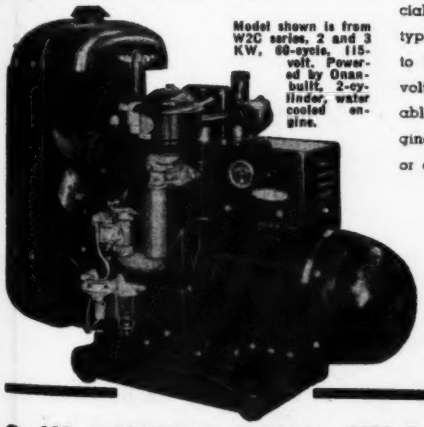
ELECTRIC PLANTS Onan

Onan Electric Generating Plants provide sure, on-the-spot electric power to meet many situations and applications in the Railroad Industry. Indispensable for maintenance work, signal systems, service and general lighting, repair shops, emergencies and other uses.

Driven by Onan-built, 4-cycle gasoline engines, these power plants are of single-unit, compact design and sturdy construction. They are suitable for intermittent or heavy duty, continuous service.



Model shown is from W2C series, 2 and 3 KW, 60-cycle, 115-volt. Powered by Onan-built, 2-cylinder, water cooled engine.

Models range from 350 to 35,000 watts. A.C. types from 115 to 660 volts: 50, 60, 180 cycles, single or three-phase; 400, 500, and 800 cycle, single phase; also special frequencies. D.C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

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D. W. ONAN & SONS 4402 Royalston Avenue Minneapolis 5, Minn.

RACINE *Portable* Rail Saws

Never more important

Because they--

★ **SAVE LABOR** — Only one man needed to operate saw and cut rail.

★ **ELIMINATE HEAVY ON-TRACK EQUIPMENT** — because they are compact, lightweight and portable. They can be transported anywhere for any rail cutting job.

★ **DO FASTER CUTTING** — Only five minutes to cut an 80 lb. rail. A 100 lb. rail can be cut in only seven minutes.

★ **SAVE RAILS** — Racine Saws do a clean job of rail cropping. No shattering of rail ends — no overheating or burning of grain structure.

★ **SAVE POWER, TOOLS and TIME** — more important today in time of material and labor shortages than in time of peace.

Racine Portable High Speed Rail Saws are available with gasoline engine, electric or air motors. Complete details are given in our Bulletin 58A. Write for a copy today.

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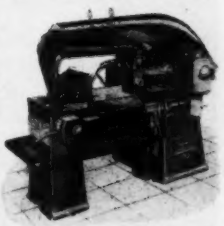
A complete line of models for high speed production and general shop work. Truly the latest development in metal cutting machinery for fast and accurate cutting of any metal. Capacities 6" x 6" to 20" x 20" in all price classes. Investigate Racine's scientific metal cutting controls. Ask for Catalog No. 12.



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for Handling
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and Similar Liquids

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Bulletin No. 306—Facts about Rotary Pumps
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Capacities to 750 GPM ***Pressures to 500 psi***

POWER PUMPS · HAND PUMPS · EZY-KLEEN STRAINERS

Avoid Delays To Traffic

by using

Q and C DERAILS

Place Q & C Derails at clearance points to help guard against interruptions in service on your principal tracks. Made in Hand Throw, also Sliding and Portable Types all adjustable for various sizes of rail, hence no adzing or shimming of ties is necessary and inventories are reduced.

SPECIFY Q & C DERAILS for safety, economy and durability.

THE Q AND C COMPANY
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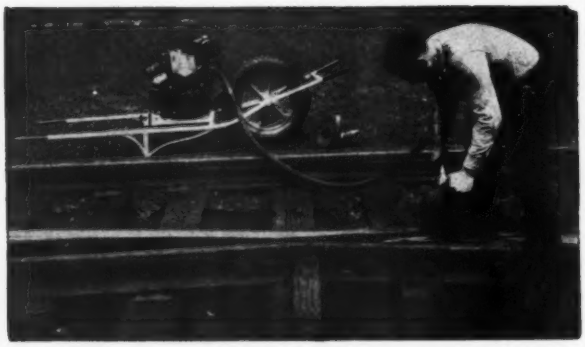
Ease War-time Track Maintenance

Many track maintenance jobs can be simplified with our P-22 Flexible Shaft Grinder, an easy-to-handle, off-track unit, which operates various RTW auxiliary attachments for surfacing welded rail ends, grinding flangeways, crossings, switchpoints, stock rails, and rail-end slottings. It is also used with our P-34 track drill for rapid drilling of rails of different sizes. Write for bulletin and prices.



Model P-22 Flexible Shaft Grinder—one of many models

Railway Trackwork Co.
3207 Kensington Avenue, Philadelphia 34, Pa.

7599

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TRACK AND TURNOUT ENGINEERING

By C. M. Kurtz

Formerly Assistant Engineer, Engineering Department, Southern Pacific Company

The Third Edition of this handbook on design details of railroad turnouts and crossings, with mathematical treatments of track layouts and connections, is now ready. Track engineers, transitmen and design draftsmen will find it very helpful for the laying out of turnouts and crossings. Mathematical treatments of problems of track layouts and connections are worked out in detail with the aid of numerous drawings. Many solutions are based on the author's experience of more than 40 years on five railroads.

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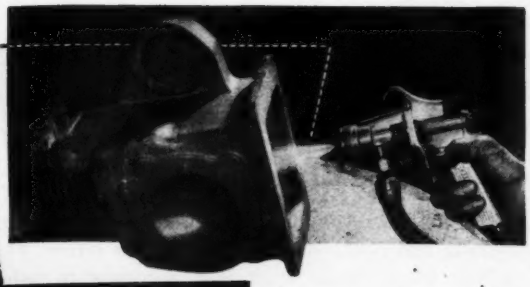

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ISN'T OVERLOOKED, EITHER, IN BUILDING
WISCONSIN
Air-Cooled
ENGINES

The interior of every Wisconsin Engine casting is sprayed with red sealer. This adds nothing to the "beauty" of the engine but it IS an important service and maintenance precaution — because it forever seals any loose particles from entering the oiling system and causing trouble.

Small details such as this are important in safe-guarding the engine user against equipment lay-ups and expense which could otherwise result. You get dependable, heavy-duty serviceability when a Wisconsin Engine is on the job.

Most H.P. per pound
WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Operation At Any Angle Is Safe!

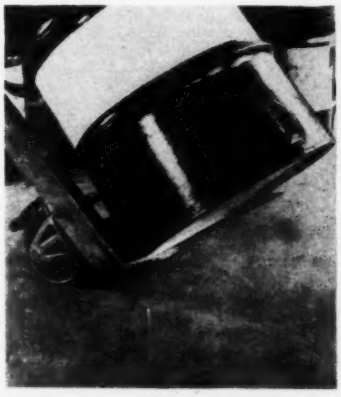
A rust-proof tension spring, located squarely in back of both the lifting and retaining pawls of all Simplex Single Acting Track Jacks assures safe operation at any angle. A sharp "click" informs the operator that the pawls are meshed. Electrided gibs and a hardened steel plate for retarding wear impart long service life to Simplex Track Jacks.

Simplex No. 217 Track Jack, 15-tons capacity. Height 22¾". Lift 13". Toe lift 2⅛" from ground level. Weight 60 lbs.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks

Templeton, Kenly & Co., Chicago (44), Ill.
Better, Safer Jacks Since 1899

Keep Floors Level—Speed Traffic with Quick-Floor



Repair or Resurface . . .
Inside or Outside . . .
STATION PLATFORMS
COACH YARDS · FREIGHT YARDS · BAGGAGE ROOMS
. . . DRIVEWAYS

QUICK-FLOOR is ready-mixed—is easily laid (a square foot a minute)—sets by pressure—requires no drying time—can be used as soon as laid—outwears the original concrete. . . . Unconditionally guaranteed. . . . Write or phone today for help on your specific problems.

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TAMP
TRUCK OVER
NO WAIT FOR DRYING

HERE'S THE QUICKEST, BEST WAY TO
PATCH BROKEN FLOORS

Flexrock offers a new plastic repair material which is ready for traffic almost the moment it's put down. There is no waiting. Simply shovel INSTANT-USE into the hole or rut—tamp—and your floor is restored to solid smoothness . . . back in service without delay. Tough INSTANT-USE bonds tight to old concrete, makes long-lasting heavy duty patch. Withstands extreme loads. Keep a drum on hand for emergencies. Immediate shipment.

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Please send me complete INSTANT-USE information and details of FREE TRIAL OFFER—no obligation.
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Company .....
Address .....

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SPREADER-DITCHER

is the logical, economical machine to use for getting ditching and roadbed shaping done in a hurry. This important maintenance work is a necessity to help keep roadways in good condition the year round.

Does the Work of an Army of Men!

O. F. JORDAN COMPANY EAST CHICAGO INDIANA

Walter J. Riley, *President*

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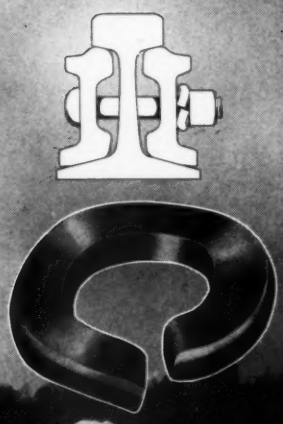
Heavily loaded freights and speedy passenger trains are pounding tracks incessantly.
The task of proper track maintenance is terrific.
Improved Hipowers help do this job.

IMPROVED HIPOWERS
IMPROVE TRACK



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A COMPLETE LINE OF RAILWAY SPRING WASHERS

MATCHING THE PACE OF WAR

Blue Brute Track Teams are helping hard-pressed maintenance men keep up with heavy travel demands created by a world at war . . . competitively and profitably.

Speed, stamina and teamwork stand out in every Blue Brute detail. For example, the Blue Brute Hand-I-Air Compressor . . . so light two men can handle it . . . delivers 60 cu. ft. a minute, smoothly and economically, through light, tight, fool-proof Feather* Valves, to four WTT-7 Tie Tampers with leak-proof throttles. No other tamper fills voids under ties so fast. No other rugged, powerful tamper weighs so little . . . only 42 lbs. Such Blue Brute teamwork adds up to more lineal feet per day in finished surfacing.

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*Reg. U. S. Pat. Off.

H5-9

Behind the Fighting Fronts with

BLUE BRUTES

Between allied spearheads and the supplies that keep them moving ahead are Blue Brute Track Teams helping build or repair the vital railroads without which break-throughs become busts. And here at home, Blue Brutes are helping railroad maintenance men make transportation history.

***Get more* WORTH *from air with* WORTHINGTON**

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

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